

ROYAL COMMISSION ON IRISH PUBLIC WORKS.

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APPENDIX

TO

FIRST REPORT

OF THE

ROYAL COMMISSION

ON

IRISH PUBLIC WORKS.

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MINUTES OF PROCEEDINGS, EVIDENCE, AND INDEX.

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*Presented to both Houses of Parliament by Command of Her Majesty.*

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# THE ROYAL COMMISSION ON IRISH PUBLIC WORKS.

## MINUTES OF PROCEEDINGS AND EVIDENCE.

FIRST DAY—TUESDAY, OCTOBER 26TH, 1886.

Oct. 26, 1886.

The Commission met at 8, Richmond-terrace, Whitehall, to consider their course of proceedings.

SECOND DAY—WEDNESDAY, NOVEMBER 3RD, 1886.

Nov. 3, 1886.

THE COMMISSION MET AT 35, MERRION-SQUARE, DUBLIN.

Present:—Sir James Allport (Chairman); James Abernethy, Esq.; J. Wolfe Barry, Esq.; J. T. Pina, Esq.

W. R. Le Fanu, esq., called in and examined.

W. R. Le Fanu, esq.

1. The Chairman.—We have nothing before us to indicate what you wish to say; so that we must leave you to make your own statement, and after that, if we should require to put any questions to you, after we have considered what you have said, you will kindly favour us with your presence on another occasion.—Certainly. I have been in charge of the material drainage department of the Irish Board of Works, since shortly after I joined the Board in 1863. Sir Richard Griffith, the then Chairman, had it in charge for a time, but it was very soon handed over to me. Previous to that, under the Act 5 & 6 Victoria, chap. 89, there had been 119 drainage districts carried out under the Board. The procedure, as perhaps you are aware, was different at that time from what it has been since 1863. The Board of Works, under the Act I have referred to of 5th & 6th Vic., chap. 89, carried out the works themselves, having previously, in the first instance, obtained the assent of two-thirds of the proprietors to the constitution of the district. I suppose I need not go into the details of the working of that Act, as they are fully described in the Report of Lord Clitherton's Committee which you have before you. Originally there was to be the assent of two-thirds, but when the famine came on in 1846 and 1847, it was reduced to the assent of one-half of the proprietors. The works were then carried out with the results which you will see in a table which I shall put in [Pine Appendix.] These were then complaints of the excess of cost, the proprietors could not pay the amount, and there was a Commission appointed, and Sir Richard Griffith, Colonel Harcourt, and Sir John McNeill, held meetings in all the districts, and decided what would be a fair charge to put upon the proprietors for the improvements that their lands had received from the drainage. There were very large reductions made, you will find the amount to be something like a million or more, from the actual cost of the districts; and the proprietors were only charged with the benefit they were supposed by that Committee to have derived from the works.

2. How was the balance ruled—how was the million reutilised?—It was a free grant from Government. The Government having expended all the money on the drainage, an Act of Parliament was passed reutilising that charge. There was power given to the Commissioners of the Board of Works—on the application of a landlord who could not agree with his tenant, provided that tenant was a leaseholder—to fix on the tenant, after hearing all that the tenant and his witnesses had to say, what increase in rent the tenant should pay to the landlord, by reason of the improvement his farm had received. In general the landlords

arranged with their tenants, and the applications were not very numerous. There were great complaints then of the Board of Works having carried out these works at an undue cost; and in a great number of cases, as you will see from this table, especially in the larger districts, the original estimates were very greatly exceeded. There were causes for that which did not operate under the subsequent Act; though the excess over estimates of the districts carried out under the subsequent Act, is just as great as the excess over estimates of the districts originally carried out. Some of the causes that led to the excess were these:—the works were undertaken as relief works, which of course makes a very great difference in the cost. You are obliged to employ labourers that are not fit to do the work, and that you would not otherwise employ, in order to give employment to the poorest class of men; you are obliged to work at all seasons, e.g., in winter, when you would otherwise suspend these works to some extent; and more men are forced upon you than can be very profitably employed on the works. That was one of the principal reasons. Another reason was that all these works, after a short time, were suspended by Government for two to three years—almost all of them. The interest as a charge on the land was accumulating during that time when no works were being done; and as you will see in this table, the interest is a very large item, comparatively, with regard to extra cost, to the districts executed under the subsequent Act.

3. Mr. Barry.—Do these two causes apply to both Acts?—They do not apply to anything subsequent to 1863.

4. Do they apply to the time during which the Board of Works did the work?—To almost all the districts during the time that the Board of Works did the work. In 1863 an Act was passed throwing on the proprietors the duty of carrying out these works. Under that Act the proprietors apply to the Board by a petition praying that we might constitute by a Provisional Order (which has subsequently to be confirmed by an Act of Parliament) a certain district. The Act requires that on receiving the petition we should return the plans, &c., the petitioners have prepared, to be lodged for public inspection; and that we should appoint an inspector who, on a certain day stated in a notice of the lodgment, should inquire into all objections. This notice calls for objections to the project, in fact he would inquire into the whole project to see whether he could recommend it, whether any alterations should be made in the plans, estimate or in the schedule as to the anticipated

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improvement in the land, or in the extent of land which would be benefited. Very often he would strike out a portion of the land which the petitioners originally thought would be benefited, but which he did not consider would be benefited, in other cases he would add portions that might be benefited.

5. Mr. Pim.—Were those Inspectors permanent officers of the Board?—No, they were not our officers; they were the best men we could select at the time—men that we thought had most experience in drainage works. Mr. Roberts, our present Commissioner, was one whom we largely employed whenever we could avail ourselves of his services. Mr. Kelly, who had been one of the best men we had had in carrying out the former drainage works (and who was afterwards largely engaged on a railway contractor) we appointed as another. Subsequently we employed a Mr. Kane, who afterwards carried out a good many districts under the subsequent Act very successfully. We always got the best men we could. Mr. Roberts is not available now, being a Commissioner of Public Works; Mr. Kane is dead, and Mr. Kelly is dead, but we have employed since their time the best men we could get—Mr. Barrington, of Limerick, who has had large experience in drainage works, and others; also Mr. Hill, the County Surveyor of Clare, who has had very large experience in works of that class. I should mention under the first Act there were 119 districts carried out, of which I have in a list (vide Appendix) showing the name of the district; the county or counties in which it is situated; the area of the drain basin; the extent of flooded lands; the anticipated improved value per acre; the amount expended on works; the amount of interest; the total, and the cost per acre and the return per cent. per annum. I will hand in these returns for both Acts (vide Appendix).

6. The Chairman.—Up to what date would that be?—That would be all previous to 1863, but the first were practically completed about 1857, and the final awards were made about 1859. There were forty-two districts executed under the Act of 1863, of which I will give you further information by-and-by.

7. Mr. Pim.—What was the date of those remissions of which you spoke?—1859. It was after many complaints had been made.

8. The Chairman.—Which is the second Act?—26th and 27th Victoria, the Act of 1863. There was the 27th and 28th Victoria, chapter 73, after, and there were several amending Acts. The first Act is the Act of 1842, and there was an amending Act of the 8th and 9th Victoria, cap. 54, and the second Act is the Act of 1863. I shall also put in an abstract (vide Appendix) showing the cost and the comparative return in various classes of districts—those which cost over £70,000, those which were between £30,000 and £70,000, those which were between £5,000 and £30,000, and those under £5,000—from which you will see that the estimate was much more largely exceeded in all the large districts than in the others. The smaller districts were the most profitable, the returns being much more and the expenditure much less. You will see the same result to a great extent in the expenditure under the later Act.

9. Do you give your reasons why that extra expenditure was incurred?—As far as I can. I cannot say much as to the later Act. With regard to the earlier Act I have given as far as I know the reasons, and I shall say something upon the later Act, giving you my reasons as far as possible. Continuing my statement as to the proceedings under the Act of 1863, I had got as far as the appointment of an Inspector. The Inspector reports to the Board of Works, making such alterations as he thinks necessary in the plans and estimates. His report is then lodged for public inspection with the plans as amended by him. Objections are called for, and forms of assent are sent to the petitioners, in order that they may obtain, if they can, the necessary assents to the district; which up to a few years ago was two-thirds of the proprietors.

That was subsequently amended by a Bill brought in, I think, by the O'Connor Don, who was anxious to lower the proportion to one half of the proprietors, that is, provided one-third do not dissent in writing. After we have considered all the objections made, and seen that the necessary assents are given, we constitute the district by Provisional Order, which is of no force until it is confirmed by Parliament; and there have been very few cases in which there has been opposition in Parliament to the orders. The Drainage Board then applies to us for a first instalment of the loan which has been sanctioned by the Treasury, which loan is the full amount of the estimated cost of the works.

10. Mr. Barry.—May I ask whether a "proprietor" is strictly the landowner, or whether the leaseholder is in any way held to be a proprietor?—A leaseholder who has a lease of forty years unexpired, is a proprietor.

11. But not under forty years?—Not under forty years. I should have mentioned that the original Act of 1863 did not propose that the Government should advance the whole of the money, but that the Drainage Board should raise money twice to the Government charge. That was found unworkable altogether for no one would lend. Therefore the amending Bill was brought in, enabling the Government to lend the whole amount of the cost of the works. We then make them a loan, the first instalment being one-fifth of the amount of the loan, provided that in large loans no instalment exceeds £10,000. Having expended that, they apply to us for a second instalment. We then have an inspection of the works to see that that money has been duly expended on the sanctioned works; and we also have all accounts and vouchers sent up and examined by our accountant, and on seeing that that amount has been satisfactorily expended, we issue a second instalment, and so on until the completion of the works.

12. Mr. Barry.—As the costs of the preliminary inquiry paid for out of the first instalment?—They are all made part of the loan on the district.

13. Are they paid for out of the first instalment?—Yes. In all districts the time in which the works ought to be completed is limited by their Act, which we have the power of extending for three years further, on cause being shown.

When the extended time has expired we have no further power, and the Drainage Board has to get, as they have had to do in two cases, an Act extending the time further. These cases were the Upper Liffey and the Suir. The Upper Liffey took an unusual time to do from various causes, and its cost was enormous, nearly double the estimate.

14. Do they have to get a special Act of Parliament for that?—Yes.

15. Not a provisional order?—No; the Treasury said they were advised they had no power to being in such a Bill, and that the Drainage Boards themselves must bring in the Bill for extending their time for the completion of the works. On the completion of the works, or as soon as possible afterwards, we frame a draft award, charging the whole amount of the cost of the works and the interest that has been accumulating on the advances on the Proprietors proportionately to the estimated increased value of their lands. We then lodge that draft award for public inspection, and we give notice that one of the Commissioners (generally it has been myself unless something interfered with my doing so and Mr. Roberts took my place), will hold a meeting to hear objections to the draft award. Having heard all these objections, and altered the award as may be necessary (still charging the whole amount on the proprietors), we then make that award final. Up to the year 1871 the proprietors had no power to ask us to fix the increased rent that their tenants were to pay, except with regard to tenants who had leases, it being supposed that they could deal with the tenants from year to year themselves. The applications were therefore very few. When the Land Act of 1870 was



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passed it was necessary that the power of putting the increased rent on the tenants should be extended to tenants from year to year. But even since then the applications have not been as numerous as you would have supposed. The landlord, I think, as a rule, have settled with their tenants the increased rent they have to pay for their improvements, and when that is not as they apply to us, stating what increased rent they think should be placed on the tenants. We give notice then to the tenants and hold an inquiry as to what advantage the tenant is to gain, and we fix a fair increased rent as far as we can possibly ascertain it, hearing all the evidence of the tenant and of the proprietor, and judging from our own knowledge of the works, and from the schedule of improvements, we fix on the tenant whatever we think is the actual value of the improvements which has accrued to him from the works. Of course the landlords are at a very heavy loss where the estimates have been largely increased. In some of these larger districts, under that later Act that I mentioned, the cost per acre was £7 18s. 8d. which the landlord has to pay. The tenant pays £3 11s. 6d. per acre at most. We never put more upon him than the improved value in the schedule.

16. The Chairman.—Are these statute acres?—Statute acres.

17. Mr. Pitt.—Is that the capital value of the improvement?—Yes. The improved capital value is 6s. 8d. per acre, £3 11s. 6d. is the return per cent. per annum on the outlay. The cost was £7 18s. 8d. per acre, which the landlord paid; and the most which could be put on the tenant would be the £3 11s. 6d., and in many cases less, because the tenant showed that he was not improved up to the value stated in the schedule, but under more.

18. Mr. Barry.—What does that amount to in annual value in the two instances?—Thirty-five years is the longest time they have for repaying it.

19. The Chairman.—They take thirty-five years to refund that money?—Yes, they pay five per cent. on the loans to pay off their charge.

20. Mr. Pitt.—The money is lent at 5½%.—Yes. That is, practically, 5½%. We have only power, I should mention, under the Act to fix the time of payment either at twenty-two years or thirty-five. I remember when that Act was introduced we recommended that we should have the option of fixing a number of years between twenty-two and thirty-five, according to the scale of return, but Parliament chose to fix it at these two definite periods, so that what we do now is, if a district does not allow a return of 6½ per cent. we apply to the Treasury for permission to extend the time of repayment to thirty-five years.

21. The Chairman.—The whole of the £11 of the landlords and the tenants would be repaid in thirty-five years at 5 per cent. 1.—Yes.

22. Mr. Barry.—Is it £11 in the two instances?—I thought that the total was £7 18s. 8d. 1.—That is the total, and not £11; that is what the landlord would have to pay; but he would be recouped in those cases something approaching one-half.

23. The tenant, therefore, would pay 5 per cent. upon that lower sum—approximately 1s. in the pound?—Yes, we should fix the tenant to pay probably 6s. 8d. an acre in the instances referred to.

24. Mr. Abernethy.—Whatever you think the increased value of the land is?—Whatever we arrive at as being the true improvement to him per acre we would give an instrument to the landlord enabling him to make that part of the rent. The Land Act, of course, very much interfered with the working of the Drainage Act, because landlords have little interest in undertaking these works now, and I think very few will be undertaken unless assistance is given by the Government in the way of grants. I hardly know of any district in which the Act will be applied.

25. Mr. Pitt.—Are you now speaking of the Land Act of 1881?—Yes, and the other Act affected it, too, to a very considerable extent.

26. Still there have been some carried out?—Yes, forty-two districts have been carried out altogether since 1863.

27. Do you know how many since 1870, which is the date of the first Land Act?—Not at the moment. The last Land Act is the Act that has really most affected it, because those tenants who have not gone into the Land Court to get their rents fixed do not care very much what we put on them, and I tell them "if you are dissatisfied with what we put on you as an increased rent you can go into the Land Court, the Land Court will see the land just as it is and they will fix whatever rent they think is a fair rent." The landlord may contend that he ought to get the addition put on by the Board of Works. The tenants say, "The Land Court will probably say what the Board of Works have put on may be perfectly fair and right; but if so the previous rent was too high and therefore we will fix the rent accordingly." So that I do not think the landlords will consent to persons name districts.

28. Have any districts been carried out since 1881?—Yes; and there are a few being carried out now. Two very large districts were undertaken about the year 1877—the Sack and the Elm. They did not begin to work on the Elm road about 1881; the Sack, I think, was about the same time. Those two districts will be, I am afraid, very bad for the proprietors. With regard to the Elm the estimate is already exceeded, or will be, by £20,000 on an estimate of £10,000, and that will reduce the return to about four per cent, where it was expected to be eight or nine per cent.

29. Mr. Pitt.—Is the work on the Elm complete?—No, and will not be for three or four years. They may have to get an Act of Parliament. The Sack got an Act of Parliament last Session to extend their time for the completion of the works. In that Act there is a section inserted enabling the tenants to elect members of the District Drainage Board; that is the only provision in it regarding tenants, making any alteration. In the Bill that was introduced in 1884 and 1885, but has not passed yet because it was blocked by some Irish members, and has been blocked every Session,—the Arterial Drainage and Land Improvement Bill—there is a section enabling, under certain circumstances, the tenants to take the place and the liabilities of the owners. This is with the view to try to enable districts to be carried out with the consent of the occupiers, at least it is the first step towards that. But I do not think either of those provisions would work satisfactorily. One provides that if the owner agrees to let a tenant stand in his place he may do so. Well, an owner will not agree in the tenant standing in his place, because he is only liable during his tenancy and on the expiration of the tenancy the owner becomes liable. The other provision of that clause enables our Board, if we see sufficient cause, should the owner not consent, to put the tenant in the place of the owner, if the tenant wishes to be so placed. We are to consider all the circumstances of the case, but the landlord is not prevented from dissenting; and a proportion of one-third dissent prevents us being able to make a Provisional Order, so that I do not think the clause will work in promoting districts. My own opinion is that unless the tenants are the parties to elect the District Drainage Board, to be liable for the amount of loan, and to be the assessing parties, no more districts of any great extent will be carried out.

30. When you use the word tenant, do you mean occupier?—That means any occupier.

31. Whatever the term of his occupation may be?—Any occupier. Of course landlords who occupy the land themselves would be assessing so far as their own lands were concerned, but not as far as land in the hands of tenants.

32. The Chairman.—Does the assent of the tenant of to-day bind his successor of to-morrow?—Not under the 1881, but it should according to my idea—it should bind the tenant's interest.

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33. Mr. Pim.—But, if instead of disposing of his land, he lends it back to his landlord?—The landlord becomes liable then.

34. Is that the law at present?—Yes, that is the way it works. The landlord at present lends his encloser in the same way.

35. Mr. Barry.—But the other suggestion would permit the tenant of to-day to bind the landlord?—Yes; I think it is quite fair that he should, because it would bind the interest in the land, and therefore bind the landlord to the extent of the improved value.

36. It would be a first charge on the letting value of the land?—Yes, it should be a first charge on the occupier's interest in the land. The tenant should have to pay it not as rent to his landlord, but as an independent charge, collected like a county cess or poor rate. In the collection of County Cess suppose a farm is vacant, and that this year no cess can be collected off that farm. In the next half-year the loss in the cess by reason of that farm being vacant is put on the whole district, it is added to the cess of the next year; that gives an interest to all the occupiers to see that every one pays his cess as far as he can.

37. Then if it were a yearly tenant charging his land he would charge his land as against the landlord, and cause the succeeding tenant to pay the landlord so much less, in consequence of this charge?—There is a difficulty; and the landlord would object to this, very likely, also because he would say if a man is charged for an acre more for the land, owing to these improvements, he will make that a reason why he is not able to pay his full rent. So that there are difficulties in the way of working it out. Then of course the tenants would never assent if they were to be charged the whole cost of the work; they would only assent on knowing beforehand what they would be charged. And if the cost exceeds the estimate, there is no way of meeting the deficit then, except by making that a matter of grant, and without grants, and without the tenants being made primarily liable, I think there will be very few more districts carried out. With regard to the excess of cost it is very hard to give a reason in these recent districts. It has been most remarkable in the larger districts. They had great difficulties with their contractors. Some contractors failed and broke down, and they were for years carrying out the works. Of course interest accumulated with the length of time, and the payments to the engineers increased, and everything of that sort, the estimate has been nearly double in one, and very nearly so in another large district where, I think they had four engineers jointly carrying it out—that is the Mulkear District. The Rushangan district, in the Queen's county, was another. There was one engineer I have already mentioned—Mr. Kane—who lately, until his death about three years ago, we largely employed in inspecting districts where he was not at all interested himself. We had known him for years. He had originally carried out some very successful districts under the earlier Acts for us. He got up six districts under the Act of 1863. His estimates were only exceeded by 85 per cent. or thereabouts, and his districts were, all six, paying districts. He was a man of great experience in drainage works, and a man that I do not think would have tried to urge proprietors to get up a district unless he thought it would be a really paying one. I do not, of course, like to mention any other engineers, but I think part of the cost has been due to engineers not being as careful or as skilful as they might have been. It was due also to the District Drainage Boards not attending to their duties as strictly as they ought. And that, I think, is evidenced by the fact that after all this expense has been gone to the District Drainage Board whose duty, when the district is completed, is to maintain the works in proper order, in a very large number of cases, entirely neglect that duty. Any one charged under the award, or whose lands are affected has a right to complain to us. I may

mention that I was an engineer, in large practice in Ireland, before the Act of 1863, and I had seen a good many neglected districts, and I consulted Colonel McKerrill upon the subject, and suggested that we should do something, and that it was a great pity to see these districts, upon which such large sums had been expended, becoming useless, and we got the Drainage Maintenance Act passed about the year 1866. We got power thereby, if anybody injured should make a complaint to us, to call upon the District Drainage Board to carry out the works to put the district in proper order; and if they neglected to do so we should step in and do it, and charge the proprietors with the cost. We have done that already in thirty-one cases. Therefore, you may think to what an extent the works have been neglected. In the Boyne district, which originally cost £21,000, they had neglected it for twenty years—did nothing. We had to come in, and it cost £7,000 to restore it to its original state.

38. What is the ordinary machinery for charging the cost to maintenance. Is a rate made—does the District Drainage Board levy a rate?—Yes, but we fix a rate on the landlords if we step in. I should have mentioned, perhaps before, that in fixing the increased rent on the tenant we put some small portion of the maintenance rate on him; but the landlord is the person liable for the maintenance afterwards. The average cost of restoring districts which have been neglected for fourteen or fifteen years, has been from nine to sixteen per cent. of the original cost; but the Boyne, from peculiar circumstances, cost nearly thirty per cent. We try, as far as we can, to get the District Drainage Board themselves to execute the works, and it is only in the last resort that we step in. But in some cases the District Drainage Boards have asked us to do them ourselves, as they thought it would be more satisfactory.

39. Mr. Pim.—The cost of maintenance falls entirely on the landowners?—The cost of maintenance falls entirely on the landowners, except so far as we have added something in fixing the increased rent on the tenants. We think it is only fair that the tenant should pay a fair portion of the charge for the maintenance, as he is the man benefited.

40. That is in making your original award?—No, the award does not affect the tenants at all. The tenant has nothing to do with the award; but on the subsequent application of the landlord we fix what increase is to be paid by the tenant.

41. Have the tenants any power of complaining to you if the works are not maintained?—Yes; and under the Act we have the power, independent of anyone applying, if we find that the district is neglected, of stepping in ourselves.

42. Is that under this Maintenance Act of 1866?—Yes; we have power either ourselves of inspecting a district and if it is not properly maintained calling on them to execute the works within a certain time; or if the tenants complain in the first instance we send the complaint to the District Drainage Board, and on receiving their report we send it back to the tenants who have complained and hear what they have to say in reply. Then if we find it necessary we call upon the District Drainage Board to execute the works. We found in some cases the complaints were groundless.

43. The *Chaisson*.—The District Drainage Board consists I suppose of landowners?—The District Drainage Board consists of landowners exclusively, of proprietors within the district; or their agents may be on the Board representing them. In the districts executed under the Act of 1863 none of those which cost more than £20,000 were remunerative; they were all a loss to the proprietors. There were five of these altogether. Of twenty-two districts between £20,000 and £5,000 eleven were remunerative, and eleven were not. Of sixteen districts under £5,000 twelve were remunerative, which seems to show that the smaller districts are the paying districts.

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W. H. L.  
Faint, Esq.

44. Mr. Pies.—What do you mean by remuneration?—I mean that the charge on the landflood did not exceed the benefit he got.

45. That is the increased rent he got from the tenants?—Yes.

46. The Chairman.—Then all above £30,000 are failures?—They were all more or less failures. Of course they were a very great benefit to the country generally in the improvement of the land; but a loss to the proprietors. Under the Act of 1863 nineteen districts were brought forward and afterwards abandoned from various causes. One, the Scirff, in the County of Clare, was abandoned because they were frightened at the Land Act and would not go on. That was a district that apparently would have been a paying one.

47. Mr. Pies.—At what date was that abandoned?—since 1881?—I should think since 1881. The Scirff Board, I believe, have let the time lapse; and they will have to get a renewal of their Act if they wish to go on. I do not think there is anything further on the general drainage question that I have to state, unless you wish me to say anything with regard to the Barrow.

48. Mr. Barry.—Is there any jurisdiction over navigations, where navigations act as drainage conduits?—Yes; we have in the Shannon; but the Shannon is not, properly speaking, a drainage district. It originally was intended that the proprietors should be charged for the improvement of their lands, and it was anticipated that a larger number of acres would be improved. There was no charge put on the proprietors for any land improvements that were done by the Shannon Commissioners. There were about 15,000 acres relieved, but there was no charge for it.

49. That was not quite my question. Assume that a navigation is bound by an Act of Parliament to maintain its navigation at any recognised or prescribed depth, and that navigation seeks to do so, does the Public Works Department step in and take action against the navigation?—I think so. We have had no case of it yet, but we have the power on the application of five ratepayers.

50. The Chairman.—Have you the initiative?—No. There is only one case to which that would apply, and that is the Bann. The strange kind of arrangement in the Bann is that the trustees of the navigation are to maintain the channel, with the exception of the five weir basins; whereas that channel is as necessary for the drainage purposes as for the navigation, and the drainage trustees have only to maintain it so far as those weir basins or embankments are concerned. The navigation trustees have neglected the work very much. The navigation does not pay. But the drainage trustees have expended £1,000 a year on the maintenance of their works; and in the years 1875, 1879, and 1880, they expended £3,000 in clearing out those weir basins on the Bann. They expended, I think, £3,000 in 1875, £1,000 in 1879, and £1,000 in 1880 (I think those were the years), without any beneficial result, because it was of no use unless the other portions of the river, which are in charge of the navigation trustees, were also cleared out.

51. Mr. Barry.—What I wanted to know is whether the Board of Works could take action against the Navigation Board?—Yes, we could. We have power; but I think we have never had a case.

52. Mr. Abernethy.—That would only be the case where the neglect of the navigation affects the drainage?—The powers we have are very similar to what they are in the Piers and Harbours Act; if a pier is neglected anyone may complain to the Lord Lieutenant, and he then applies to the Treasury to get a loan to carry out the works through us.

53. From your experience of the working of these District Drainage Acts, may I assume that in carrying out these works, lands outside the district have been benefited?—I think they are benefited.

54. And they go not-free?—They go not-free. It is not only the flooded lands that are charged; but

outside those lands in the district may be benefited to some small extent.

55. They escape all taxation although they derive benefit from the drainage of the lands included in the district?—I think in large districts they derive benefit in a sanitary point of view—in improving the climate, and in the earlier ripening of the crops—I mean in large districts like the Barrow and the Bann. I think there it would be only reasonable and fair, if the Government were making a grant, that some small tax should be put on the whole of the main basin perhaps.

56. Does it go a step beyond that? Do you confine your answer to the sanitary improvement or does the land itself derive benefit?—I do not think the land derives any benefit beyond land within five feet or so over the flood level, and all that is charged. All land that we suppose to derive any benefit and land is charged in the award proportionately to the benefit received.

57. And your opinion is that no land above five feet over the flood-level is benefited at all?—I do not think so, except it be in a large district where the damp exhalations are got rid of.

58. Supposing the lands of the higher districts are drained, they discharge a much larger volume of water than when they were undrained on the lands below them?—Yes.

59. Is not that a question for consideration on the subject of taxation?—I do not think they would affect the lands below injuriously if larger watercourses are provided.

60. The Chairman.—But to provide these larger watercourses involves expense, and the question really is whether the lands above the five feet flood-level are not injuring the lower lands by draining the upper lands so thoroughly and quickly; and whether they ought not to be taxed to a certain extent?—I think it would be very difficult to ascertain that extent at all.

61. Probably you are aware that this is a question which has been very largely discussed in England?—Yes, the Conservancy Bill which passed the Lords but did not pass the Commons gave power to charge what are called the up-lands.

62. Yes. What I want to get at from you as a practical man in these matters is your opinion as to the value that can be placed on the improved condition of the up-lands in consequence of the flood water being taken off so much quicker and thereby involving larger and more expensive works in the low-lands?—Well, I should not think that they gained much in that way.

63. Mr. Barry.—The idea was that a man should drain his land to the sea; that he has no right to throw his water upon his neighbour, and that if he by draining on to his neighbour necessitates his neighbour making larger drains he has not done his primary duty which was to drain into the sea; and therefore he must help to pay for those larger drains?—That gives rise to a very large question of how far thorough drainage and how far the drainage above does affect the place below. Our experience is that it is very little; and that even the arterial drainage of an upper district does not materially increase the floods below. In some few instances I think it does.

64. The Chairman.—Then your attention has been called to this question?—Yes; not to the exact question you put, but to the question of whether lands below where a drainage district stops, half-way down a river we will say, whether the lands lower down that river are liable to greater floods than they were before the works of the upper district were carried out. I do not think they are very materially affected. I think in some districts where the river is comparatively small, and where there has been a large amount of flooded land, these floods become higher and do damage, because they would have spread over all that land.

65. Mr. Abernethy.—A good deal of the evidence in England went to show that the floods which now take

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place did not exist in former years before the uplands were drained?—I do not think the floods come higher, as a rule. I think they may in some isolated cases cause a little higher, but it is almost to an immaterial extent.

66. Mr. Barry.—Even supposing they were not higher than they were in former years, have you ever considered whether it is any part of the duty of those who occupy the uplands to bear their share in conveying the water to the sea rather than to throw it down upon the lowlands?—If it is supposed that they do injury to the lowlands in any way it would be only fair that they should, but I am very doubtful about that.

67. But surely the stream has to carry away not only the water from the lower portion of the lands, but also from the uplands?—It has.

68. Mr. Pies.—But if you have to improve the lower portion of the stream to enable it to take away the floods, do you not in that way make it better able to carry away the water from both?—Yes; but it carried it away before.

69. The Chairman.—In improving the drainage for the lowlands, if the uplands take advantage of the improvement by throwing down their water in three days, whereas, before, it took six or seven days to clear itself, surely the uplands are benefited by it at the expense of the lowlands?—I have not considered the question in that light.

70. Mr. Aherne.—With the improved outlet it may be worth their while to improve their drainage?—Once you are five or six feet above the flood level you could thorough-drain your land, already, at any time.

71. The Chairman.—Yes, a landlord has a right of course to drain his land; but is not it fair, in considering the money to be levied on the landowners, to ask whether they should not be taxed for the more speedy getting rid of their water?—I think it would be very difficult to do it. A man would say, "Is not my land exactly in the same condition now as it was after I thorough-drained it forty years ago? I have done no harm to anyone, and now you want to tax me because other people want to get rid of their water."

72. Mr. Pies.—Yes; but has not the water they want to get rid of or the major portion of it, come down from the uplands?—Yes.

73. The Chairman.—And much more speedily than formerly?—Yes, to some extent.

74. Mr. Pies.—If there is any improvement in the uplands by what you have done by draining the lowlands, surely they might be asked to bear their share of the cost?—But I think there would be no improvement in the uplands.

75. Would not it be fair that the uplands should pay some part of the cost of conveying away water, a large portion of which fall on their own land?—Water always came there. They did not bring it there and it is doing them no harm. It was always there, and it always ran into the river.

76. The Chairman.—Why do they drain their land if it does them no harm?—I do not think the drainage has materially increased the floods below.

77. Mr. Pies.—Do not the uplands send down a deposit of sand, mud, and gravel that causes an obstruction below in many cases which you have artificially to remove?—No, I think not. The water that comes out of thorough drainage is clear water. I think, as far as obstructions are concerned the arterial drainage ought to be carried out.—I mean as far as any injury is done to the lowlands. We have had that in a tributary of one of the old districts. The tributary that comes in near Lord Charlesville's demesne at Tullamore, that tributary brought down a good deal of gravel and sand, and they made sand traps which were to be cleared out to prevent it going into the main river.

78. The Chairman.—Yes; that to a certain extent answers in the affirmative the question I have put.

79. Mr. Pies.—Would you charge the cost of that upon the lands through which that river ran before it came to that point?—I have not thought of that. I think you would find it very hard. People who do not consent may be charged in spite of themselves, but if consents were required no man would ever consent.

80. Could it not be done by a poundage rate on the valuation?—It could, but at the same time I think the uplands are all benefited in a sanitary point of view and in other ways. Another thing is towns have not hitherto been charged, but those through which a new district goes ought to be charged for their drainage. On the Barrow district there is Monaster-evan, the gardens of which are often flooded, and Portlannington, and those towns ought to be charged fully and fairly for the benefits they derive.

81. The Chairman.—You dropped a remark just now about being taxed without their consent?—Yes.

82. I am afraid we are all subject to that, are we not?—I am afraid we are.

83. Mr. Barry.—Are you aware that this matter has been investigated a good deal of late years as to the chargeability of the uplands?—I have heard a good deal of it, but I have not read much.

84. But you have not considered the point on the general principle of whether the uplands have a right to drain their land in such a way as to flood the lowlands?—I do not think they would have any right; but I would doubt the fact that any drainage that has been done or is likely to be done floods the lowlands.

85. Apart from improved drainage, the rainfall, which has to find its way to the sea from the uplands and through the lowlands, finds its way to the sea and damages the lowlands in so doing. On general principles does that seem equitable?—You ask whether the uplands should be charged because the rain that came there went down on the lowlands.

86. The Chairman.—Let me put it in this way. The uplands, we will assume, are not drained, and consequently the rainfall, however excessive it may be, takes a certain number of days to find its way down into the valleys; but the owner of those uplands, to improve his property, drains his land and then the water finds its way down in half the time. I propose that there should be somewhere near the fact if he thorough-drained his land?—Yes, it may be so.

87. Then, surely, by throwing this water on the lowland, in half the time that it would take naturally, the lowland owner is injured and the upland owner is benefited?—If he has drained his land?

88. I submit, if he has not drained his land, it does not apply; but if he has drained his land surely he ought to pay something towards the cost of getting rid of it?—So far as he has in any way increased the floods below, I think he ought.

89. That is the whole question?—Yes; but then I do not know whether that increase is material.

90. Have you any information to give me as regards the mill dams which obstruct the free flow of the water?—In all districts that have yet been executed the mill has either been purchased or the mill-wheel lowered, and the dam lowered, so as to counteract the injurious effects; and in the Suck at Ballinacorney they are putting in sluices and regulating it in that way, but they will still have to keep the sluices so high as to maintain the head for the mill.

91. But no system of sluices and no system of dams can do otherwise than keep the water back to a certain extent?—That is so.

92. And would it not be better to do away with all mill dams where a district is much flooded?—I think it would be much better; but the Drainage Acts do not contemplate that, because there is a special clause that the Drainage Board were not to purchase a mill dam or mill unless it could be proved that the loss of the mill would be compensated for by a money payment. I never could see the exact meaning of that clause.

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43. *Mr. Alcock.*—In many cases during the floods, within your knowledge, the mill is perfectly unworkable; the waterwheel is drowned?—Yes, and the weirs are drowned in high floods. But if the weir is drowned it is practically no obstruction. If there is no fall at the weir, the water would be at the same level whether the weir were there or not—above and below.

44. *Mr. Pies.*—Have there been any cases in which bye-laws have been put in for use in flood times—putting by the mill?—I think that was proposed at Bournemouth, but they are adopting drains instead. I suppose the meaning of that proviso I mentioned is that the mill would be such a loss to the neighbourhood that it could not be compensated for by money.

45. Have you any knowledge as to the extent to which, when these drainage schemes have been carried out, the farmers in the neighbourhood have taken advantage of the staying out of one of these schemes to drain their lands?—I think the larger farmers have to a considerable extent; but most tenants have not. That is my experience, and I know that is the opinion of Mr. Roberts, who well knows the West of Ireland. One difficulty in that is that we do not see much of the districts after we have fixed the increased rents on the tenants, and up to that time they would not do much to improve their land for fear the benefit would appear to be too great.

46. You think they have not taken advantage of what has been done in that way to the extent that they ought?—I do not think they have—nothing approaching it.

47. You mentioned a remission of about one million in 1859. What proportion was that, roughly, of the whole?—I think it was about half. You will find that exactly stated. Here are two maps which show all the districts under each of the Acts I have referred to. The small figures on the map are the numbers of the awards, and here is a table showing all the districts executed under both Acts. There is another map—we have been collecting from the county surveyors a statement of what districts in their counties they thought still require arterial drainage. That map was not quite ready this morning, but it will be here immediately, showing the districts not yet executed. This shows the districts, in red, which were executed under the recent Act, and in blue, those executed under the old Act.

48. Are there any of those drainage schemes that have affected the Barrow district, where we are going to to-morrow?—Yes; the Rathagan district, and the Kildare. There was great fear that the Rathagan would have flooded the lands below very much. I was going to mention one case in which the arterial drainage did, I think, from my own observation, increase the floods below. This was in the case of the

Mulkear River, Limerick. It covered a large extent of land called Cool-na-pish. It might be about two square miles in extent. That was all relieved by the drainage. It was a very rapid river coming from the mountains, and I think now the floods below the end of the drainage district are somewhat higher; and that is borne out by the fact that one farmer there, a Scotchman named Nichol, brought an action against the District Drainage Board for flooding his land and recovered £500 damages from them, and the District Drainage Board had no means of paying it because they could only strike a rate for one year. It was a very expensive action and the costs and all came to over £1,500. They were at their wits' end to know what to do. They had no power to strike a rate for more than a year, and they could not do the £1,000 in a year; and they had to get a special Act of Parliament to enable us to lend them £1,000 to get out of their difficulty, and to spread the repayment over a certain number of years chargeable on the district. I should mention too, what I forgot to mention before, that under the Relief of Distress Act of 1880, the 14th section gives us power to make loans to Trustees of Drainage districts, under Act of 1842, for putting their districts in repair, but it does not give us power to lend to District Drainage Boards, under the Act of 1863. So in our Bill, that was before Parliament, we put in a clause enabling us to lend to both. We have made some loans to Trustees under the Relief Act. With regard to the Mulkear district the extra flooding which I have observed myself, and in one or two other districts, is not I think altogether due to the extra water brought down. I think it is to some extent due to a practice very common in the South of Ireland, in order to prevent the banks being taken away, of planting willows all along the banks; they grow up, some of them fall into the river, narrow the course, and of course raise floods above them. This happened in the case of the Scotchman as it was on his land, it might have been before his time, but willow trees were planted.

49. *Mr. Barry.*—Was the decision in this action appealed against?—I think not.

50. Do you think that only one Court decided that the District Drainage Board was liable?—Perhaps they appealed to a second Court, but they never went to the Lords. I rather think it was tried at the Assizes, and they did not go beyond the Judge there.

51. *The Chairman.*—Is there any information we ought to be in possession of in your opinion before we go to inspect the Barrow?—I think everything that you could possibly want for the purpose of your inspection is in that blue book—the Report of Lord Chelmsford's Commission. I think you have very full information in that.

*Mr. Robert Manning, C.E., called in and examined.*

102. *The Chairman.*—We observe that there is a considerable discrepancy between your statements and those of Mr. Hamard, in the report upon the Drainage of Barrow?—In what respect?

103. I think there is a discrepancy in the cost.

*Mr. Alcock.*—And in regard to the question of discharge also?—Mr. Hamard's report did not come in until the whole matter was settled, and therefore I only casually looked it over; but as well as I now remember he said 350,000 cubic feet in a minute would be discharged, while I said 400,000 cubic feet. He may be right, or I may be right.

104. *The Chairman.*—And then as regards the cost?—I cannot tell you how Mr. Hamard arrived at the cost, because there is neither plan nor anything else to show. It is a mere statement in Mr. Hamard's report. But Mr. Hamard in his report states that instead of keeping the weir in its present state below Athy he would remove that weir.

105. *Mr. Barry.*—Is that the Duke's weir?—No,

the weir a short distance below Athy, just where the canal crosses at this point. Well, what Mr. Hamard thought better to do was to add an additional chamber to the canal lock, and so get rid of the weir altogether. He told me of this, and I said, "Well, but that would be a very expensive thing to do; that canal is also a mill race, and you must either lower the works of the mill or purchase it." "Oh," he said, "What about that?—it is only £3,000 or £3,500." He did not tell me that officially; it arose in talking over the matter. Probably that would be the reason for the difference between our figures. Mr. Hamard asked me for the prices on which I founded my estimate, which I gave him; but I certainly will not attempt to maintain, when I say I can do a thing for less than another man, that my figures should be necessarily taken.

*The Chairman.*—But a matter of £75,000 is a large sum.

106. *Mr. Barry.*—On the question of discharge, do you take the 400,000 cubic feet per minute as a maxi-

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100. I regard 400,000 cubic feet a minute as the maximum that would be discharged—we have a maximum every ten years or so during the highest water-floods. The quantity is founded upon a series of experiments for many years upon the river Broom. We have in Ireland very various quantities of water from the same area; in fact, the highest that I know in Ireland is about seventeen cubic feet a minute off an acre. Mr. Bateman, I think, records some years ago in Manchester, twenty cubic feet a minute off a similar area. Well, we go down from that to the Shannon, where it is about two-thirds of a cubic foot per acre, and in all the western country we have a very much greater discharge on the same area than in the East. I think Mr. Hassard told me that he was influenced very much in his estimate of the quantity of water to be discharged, by the consideration that two-thirds or some such proportion of the catchment was very flat land. Well, I looked over the basin and I thought 400,000 cubic feet a minute would be the maximum.

107. Do you think Mr. Hassard included any works below Athy in his estimate?—Yes, he did. He included putting another chamber in the lock and taking away that weir. I do not think he included any others.

108. I ask the question because I see in the last paragraph of his statement, Mr. Hassard alludes to certain works below Athy, and talks of “removing some of the existing obstructions, lengthening the weir, or putting auxiliary sluices at them, and providing additional waterways at some of the bridges.”

Mr. Pies.—That is rather what he says would be required; but has he included those things in his estimate?—I do not think he includes them.

109. Mr. Barry.—The statement he makes about the cost is, “Mr. Manning’s estimate of £474,064 including the purchase of land and property, compensation, contingencies, and professional charges for superintendence, &c., I consider insufficient, taking into account the present cost of labour, and the nature of the works, and I do not see how the undertaking, as far as I have been able to look into the matter, for the modified discharging capacity of 320,000 cubic feet of water per minute at Athy, can be carried out for less than £525,000, or probably £550,000.”—You see the effect of decrease in the quantity of water to be discharged in Athy would not be in the ratio of 400 to 320, therefore it is no guide to the quantity of excavation to be made.

110. The quantities, according to Mr. Hassard, must be less, although the cost would not, perhaps, be lessened least?—Not extremely less, but they must be less.

111. I should think, therefore, his objection must be on the prices?—On the prices, very likely.

112. Was there any bill of quantities put in with your estimate?—No, there was no bill of quantities, but I think I can supply it if you wish.

113. I should like to have that?—I can give you my estimate.

114. Mr. Abernethy.—Mr. Hassard contemplates abolishing the weir, and that involves a good deal of work?—In my opinion it would not be an improvement to do so. It would cost a good deal of money, and I think the object could be attained without it. I should probably mention to the Commission now the circumstances under which I undertook to make a design for the Barrow. Some thirty or more years ago arterial drainage took place to a very large extent, indeed, in Ireland, there was a complete survey of the River Barrow made at the time and they went very near to completing a report, and estimate of it, but in the meantime, a change came, and all these works were stopped. The plans and sections which are here have been very accurately made, and I can see on the face of them that they were discussed by the Commissioners for Drainage, Mr. Malvern. Those plans were handed to me when the Commission was appointed, and I was asked to make a report on the drainage of the

Barrow. There was great difficulty in getting the report on the valuation of the lands, and I immediately say that two, or even three years would not be too long a time in which to prepare detailed plans and sections of the work. Being at the time an officer under the Drainage Commissioners, I knew the men who prepared those plans, and I was well satisfied that, for the purposes of a preliminary investigation of this kind, they were correct, because on the face of them were traces of very great care, showing that everything was straight. Well, I took those, and I made a design for the discharge of the quantity of water named. Then, as to the estimate. I put in it what I considered fair prices for the different sorts of work in Ireland, added contingencies, and made it up to the amount.

115. Mr. Barry.—Then your estimate was an estimate upon careful plans and sections?—Yes, upon careful plans and sections. At the same time I may mention in my evidence that with regard to the design for some of the tributaries—as you will see, I think in the table that I have put in with my report—when the detail surveys for the tributaries cease to be made, it is very possible I should be obliged to modify the dimensions of the tributary, although it would not increase or change the cost in my judgment.

116. The Chairman.—You have been over the ground?—I have been over the whole of it. I have first of all very attentively considered the whole main channel of the Barrow, and I also went up into the mountain catchments, and I certainly was very much impressed with the fact that all those mountain tributaries were discharged at pretty much the same point in the valley, and of course if you get a number of tributaries discharging nearly at one point they will give you a greater flood than if they are discharged at different points.

117. Mr. Barry.—May we take it that at the present moment you see no reason to modify your estimate?—I see no reason to modify my estimate at present. At the same time we all know that estimates are sometimes exceeded. If Mr. Hassard thinks it necessary to expend another £70,000 I make no objection to it.

118. Mr. Abernethy.—You proposed sluices?—Yes. The object of these sluices was this—that as there was very little fall I was obliged to propose sluices which would be equivalent to removing the weir altogether.

119. The Chairman.—That weir is for navigation purposes of course?—That weir is for navigation and mill purposes, but there is very little navigation now above Athy.

120. Mr. Pies.—To what extent above Athy is there presumed to be the means of navigation—to Monasteren?—Yes, they have a canal to Monasteren.

121. The Chairman.—It is not river navigation then?—The Barrow navigation is both river and canal.

122. Above Athy?—Above Athy it is all canal navigation. The existing navigation is altogether canal. In the Duke’s weir there is a lock; some boats go up there, but there is no regular navigation above.

123. There are no weirs in the river to supply the canal with water then?—Oh, no, they are merely for lifting.

124. There is no existing navigation to interfere with these?—Except only this. I spoke of the Duke’s weir. It is navigable in some places above that weir, and there is a lock at that weir which is not used. I do not think it is in order now. But, independent of that it is also a head water for the mill, and, therefore, the view I took of it was this—I did not mind the navigation, but as it will cost me so much money to put sluices in that weir if the miller consents to take a lesser sum for his mill power than these sluices and

weir will cost me, I will take them away altogether.

125. Are there many of these dams for mill purposes?—Yes, there is one above the Duke's weir; there is another about a mile below it, and three are weirs along the river at various points.

126. Above Athy they are all mills?—Above Athy there are no mills except one that takes its headwater at Athy, and another at Beek, three miles above it.

127. Then what are the weirs for?—In the lower part.

128. There are no weirs above Athy?—There are no other weirs above Athy—that is on the main river.

129. You say on the main river, but are there on the tributaries?—Yes, upon that Portliffington tributary there is a mill; but I really would prefer, if you will allow me, to give you the particulars of those afterwards—I am speaking now from memory of three years ago.

130. We should prefer that if you can give us accurate information as to the weirs, and where they are placed above Athy, and on all the tributaries, because they must more or less interfere?—I will do so.

131. Mr. Abernethy.—It would be a good plan to mark with a red line upon the river the weir and its name?—I have had all the mills examined all through the district, and examined so as to maintain them if possible consistent with drainage.

132. The Chairmen.—Are these mills chiefly corn mills or manufacturing mills?—They are generally flour mills, but in some cases on the tributaries they are manufacturing.

133. What branch of manufacture?—Well, I think there is some woollen manufacture, but really I cannot remember now.

134. Mr. Barry.—And could we ascertain the relative value of the mill?—I will give you a list of all the mills, and where they are, and what they are, and the value of Sir John Ball Green's will be able, where the valuation is not separated, to give what they consider the value.

135. Mr. Barry.—And will you give the fall at each weir?—Yes.

136. Did you inspect the river below Athy?—Yes.

137. How far did you carry your inspection downwards?—I took no sections at all below, but I inspected down to St. Mullin's; and you will see a supplementary report of mine at the end of this book giving an account of that inspection.

138. I gather then that any works that were considered necessary below Athy are not included in your estimate at all?—Certainly not. I think there ought to be a section of these. This diagram section, I may say, is a reduction of the original section. This is Portliffington stream, and you will see by the section that a great part of the proposed channel is in thorough cutting. Then here is another section; there we have Athy, and you may rely upon that section for all purposes of calculation and founding a judgment upon—quite as well as by looking over these plans. I take a choice between the alternatives shown upon these plans. There is the old river, and here is the new cutting. That will be shown on the plan.

139. Mr. Abernethy.—The alternative then is a new cut?—Yes.

140. Your proposition is to deepen the river?—Oh, no. They did not decide in old times whether they would improve that or make this new cut. I say, in my judgment, it is better to make a new cut, but, at the same time, to improve this river sufficiently to make those two combined be sufficient for the discharge.

141. This is a section between the two?—Yes.

142. Mr. Barry.—It was given in evidence that the floods have been getting worse of late years. Would that evidence affect your mind in any modifications which you would think necessary in the plans?—Not in the least.

143. It was so stated by several people?—Yes, I

think we are all aware that in this country as well as other countries people are given to exaggerate very much; and certainly, without at all depreciating the knowledge of those people, I do not think there was one atom of evidence to be relied upon with regard to the quantity of water coming down.

144. Mr. Abernethy.—They see that the river is in a state of flood for a day or two, and they form an exaggerated idea as to the amount of flood?—Yes. I may mention a circumstance that will show you what the Drainage Commissioners in Ireland have had to deal with. A good many years ago I had drained a large district in the county of Louth, and when the award, as it is called, came to be made, there was great opposition in consequence of the ineffective manner in which the drainings were alleged to have been performed. One gentleman, an engineer, whom I met on the banks, said—"Oh, there is no drainage here at all, it is just as bad as ever it was." At the time there was a flood passing on—a very high flood. I said to him, "Now, what do you say is the depth between you and the water?" He said, "Some four feet." "Well, I do not think it is," I said. He replied, "It is three feet at my rate." I said, "Now, if you will kindly examine where you are standing you will find you are standing on the bed of the old river." And this illustrates what continually occurred.

145. Mr. Barry.—You are aware that the Commission indicated in their report the necessity for some works below Athy?—Yes.

146. I think I am right in saying that the drift of your evidence was that no works were necessary below Athy?—In my opinion the quantity of land proposed to be drained above Athy would have no effect at all in increasing the floods of Athy, and that was actually the evidence given by the persons promoting the case of the Lower Barrow. That being the case, I cannot for the life of me see why they should improve the Lower Barrow. It is a very good thing, indeed, to have done, no doubt, but if I never send more water down to Athy by any works than went before, how is it possible it can increase the flood of Barrow? They say, "Oh, you send the water down more suddenly." But we only send the same quantity of water down in the river, and distribute that water more evenly, and the effect will be rather to make the maximum less on the lower part of the river than it was before.

147. But the gentlemen who were urging that it would have some effect below Athy went into some measurements, I think, as to the capacity of certain portions of the river to carry a certain number of cubic feet a minute?—I think you allude to the evidence of Mr. Price.

148. Yes?—And he made some measurements, and spoke of capacity; and if you will kindly look over his evidence you will see I asked him to give me the inclination or some data, in order to know what the fall was.

149. Mr. Abernethy.—And he was not able to give it?—He was not able to give it.

150. Mr. Barry.—Mr. Howard stated that 550,000 cubic feet went over Carlow weir?—That was rather confirmatory of everything I said before.

151. Would the accession of water between Athy and Carlow be considerable?—I forget the relative sizes of the catchments now, but it would be considerable. There are two or three districts, tributaries to the Barrow, which have been drained below Athy.—(A plan is produced and explained by witness.)

152. We should like to know what those catchment areas are?—The Barrow catchments are not here subdivided, but I can give you, I think, the areas of any of those that you like.

153. The Chairmen.—Is not the catchment basin of the part above Athy 400,000 acres?—Yes.

154. Mr. Price.—Do the people below Athy suffer from floods at present?—Oh, yes, they do. In fact if you look at my report upon the Lower Barrow you will see I give instances of where towns are flooded.

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Mr. Robert  
Hanning, c. n.

June 5, 1894.  
 Mr. Robert  
 Manning, G.R.

But I should tell you that the quantity of land along the lower Barrow is very small.

153. You mean the area of flooded land?—Yes, the area of flooded land.

154. Does the flooded area extend below Carlow weir?—The great bulk of the flooding is above Athy, next between Carlow and Athy, and below that last.

155. Is Carlow weir a weir that is sometimes stopped and drowned?—I do not think it is drowned; but I know this—when I was there they were fixing boards on the top of it. I have given a full report, I think, of the Carlow mill power there, and it appeared to me they should be stopped at once.

156. The Chairman.—There is no legal power to put those boards up?—None, except from their being there a long time, and they certainly have been there a long time.

157. Mr. Barry.—Are there many weirs between Athy and Carlow?—Oh, yes; there are two or three—I forget the number. I will mark the weirs on the plan.

158. Mr. Abernethy.—Kindly mark them in red?—I should explain that I had no idea in the world of being called to be examined to day, and a great many things have happened since I made the report.

159. The Chairman.—You will favour us with your evidence again when you have made yourself more acquainted with the recent facts of the case?—I shall be very happy.

160. Mr. Barry.—The survey did not go further than Athy, I suppose?—No survey beyond Athy.

161. Is there no survey further down south?—No, there is none.

162. Is there a large-scale Ordnance map of the country below?—Oh, yes; I can supply you with a large-scale Ordnance map from Carlow to St. Mullins, with the weirs and so on marked. It is, I think, in my office.

163. There was some suggestion that the new drainage of Rathangan sent water down more rapidly on to the flooded lands than the Barrow?—I did not examine closely into that, but I think you will always find where there is a short cutchment, and it suddenly comes down upon low lands, that immediately below there will be rather an increase of the maximum. It all depends upon the extent of the cutchment, and the shape of the cutchment.

164. Is there any other subsidiary drainage in the Barrow basin in a similar position?—Yes, there is. The Kildare district with a cutchment of 15,000 acres was one of them; and the Rathangan district is another. These two districts have been drained.

165. There was a recommendation by the Commission that some clauses should be introduced into the special Act to insure for the future that the channels of the lower Barrow should be kept properly open and free from obstruction by the Barrow Navigation Company?—Yes.

166. Is there any power now of enforcing that obligation upon the Barrow Navigation Company?—I think not. I think I alluded to that subject in my report.

167. I think you did?—And I said that whether they are subject to that obligation or not, they must use their rights without injury to their neighbours. We do not know whether they accepted that, because certainly their navigation spoiled the river.

168. Is that owing to its not having been properly maintained?—That is so. But we must remember that when that navigation was formed, it was a great boon to that part of the country. They thought of no drainage then; and even now, if we had no railways I would allow the navigation to be made to the destruction of a small quantity of drainage, and pay for the lands that were flooded.

169. If there were no railways?—If there were no railways, and no means of communication.

170. The Chairman.—Do you find that the railways in Ireland have greatly diminished the traffic on the navigations?—Oh, certainly; the railways have taken the traffic. Where a railway and a canal run

parallel to each other, the railways have generally taken the traffic.

171. However good the navigation may be?—How ever good the navigation may be.

172. That has been my experience in England, and I wished to know whether your experience here was the same?—But in regard to this particular case, it was a navigation as a means of traffic or nothing.

173. Mr. Barry.—Was there any estimate of quantity or cost of dredging out the navigation?—No.

174. No figures of any kind?—No figures of any kind. In fact, to enable any person to give figures it would be necessary to make a survey of the lower Barrow, which would be a very long matter, requiring a great deal of time.

175. Mr. Finn.—You have made several suggestions as to what ought to be done to the lower Barrow in order to make it carry off the water adequately. Did your estimate of outlay include any work to the lower Barrow?—No, none.

176. Then there would have to be an addition made to this estimate of outlay to cover those suggestions of yours, whatever it might amount to, if they were carried out?—Yes.

177. Mr. Abernethy.—The distance is thirty-five miles, is it not?—Yes, 34 Irish miles.

178. Mr. Finn.—Do you think that the carrying out of these suggestions would involve a large outlay?—I could not give any opinion upon the outlay.

179. Mr. Barry.—Are there any deposited plans of the navigation in its original state so that one can judge how much siltling up has taken place?—I investigated that and there is no doubt in the world that accretion has gone on continually. If you ask Mr. Latorche, who is the Chairman of the Barrow Navigation Company, I am sure he will give you all possible information about it. In fact I think I could give some myself.

180. Are there any deposited plans or official records of what the navigation originally was?—Yes, there was a survey of the navigation made, I forget in what year, but some eighty years ago now.

181. Mr. Finn.—That is before the Barrow Navigation came into existence?—No, at the time, and afterwards, there was a survey of the state of the navigation some thirty or forty years ago.

182. The Chairman.—Are those plans in your office?—No, they are not. They belong to the Barrow Navigation Company. I forget now, too, whether I have any notes or not.

183. Mr. Barry.—Are there no plans in Ireland like deposited Parliamentary plans?—For the formation of the works there were; but that was a long time ago. There have a very excellent survey of the navigation of a very ancient date.

184. Mr. Finn.—Is it the opinion of the Barrow Navigation Company that the river has been getting shallower down below by reason of accumulations brought down from above?—Certainly. In fact evidence was given before that Commission of their planting oysters upon some of the accretions in the river; and I may mention, though it really goes without saying, that to convert a river into a still water navigation will cause a deposit in the river.

185. The Chairman.—Is this correct—that when you were down on the navigation they showed you two plans, one made by Mr. Molloy and the other by Mr. Mulvaney?—Yes.

186. And those are in possession of the Company?—Yes. I must say that I got the greatest facilities from the Company. They showed me everything they had, giving me the heights of their lock sluices and all that. They gave me all the information they could.

187. Mr. Barry.—Do you think there is any danger of the navigation receipts becoming so insignificant that this obligation to keep open the navigation (if such an obligation exists), will become impossible to enforce?—I do not know. The navigation is, I believe, not now very profitable; but I do not know the circumstances of it.

Adjourned.



## THIRD DAY.—THURSDAY, NOVEMBER 4TH, 1886.

Nov. 4, 1886.

The Commission inspected the River Barrow and its tributaries in the neighbourhood of Athy, Monasterivan, and Portarlington.

## FOURTH DAY.—FRIDAY, NOVEMBER 5TH, 1886.

Nov. 5, 1886.

The Commission inspected the River Barrow and its tributaries in the neighbourhood of Portarlington and Mountmellick.

## FIFTH DAY.—SATURDAY, NOVEMBER 6TH, 1886.

Nov. 6, 1886.

The Commission inspected the River Barrow from Athy to Baginbstown by water, being accompanied by Mr. R. A. Mitchell, Secretary to the Barrow Navigation Company.

## SIXTH DAY.—TUESDAY, NOVEMBER 23RD, 1886.

Nov. 23, 1886.

The Commission sat at 34, Martineau-square, Dublin, and transacted various business.

## SEVENTH DAY.—WEDNESDAY, NOVEMBER 24TH, 1886.

Nov. 24, 1886.

The Commission inspected the River Shannon by water between Carrick-on-Shannon and Athlone.

## EIGHTH DAY.—THURSDAY, NOVEMBER 25TH, 1886.

Nov. 25, 1886.

The Commission visited the Drainage Works on the River Suck at and near Ballinacree, meeting the Engineer to the Drainage Board (Mr. W. G. Cashington) and other representatives of that Board.

## NINTH DAY.—FRIDAY, NOVEMBER 26TH, 1886.

Nov. 26, 1886.

The Commission inspected the River Shannon by water from Athlone to Banagher.

## TENTH DAY.—SATURDAY, NOVEMBER 27TH, 1886.

Nov. 27, 1886.

The Commission inspected the River Shannon from Banagher to Killaloe.

## ELEVENTH DAY.—MONDAY, NOVEMBER 29TH, 1886.

Nov. 29, 1886.

The Commission, accompanied by Mr. W. J. O'Neill, Engineer to the Lough Neagh Drainage District, inspected the Upper Bann and Coshin Rivers in the neighbourhood of Portadown.

## TWELFTH DAY.—TUESDAY, NOVEMBER 30TH, 1886.

Nov. 30, 1886.

The Commission, accompanied by Mr. W. J. O'Neill, visited the Lower Bann at Tomsa Bridge and Portora, meeting various persons interested in the Local Drainage.

## THIRTEENTH DAY.

## PUBLIC SITTING HELD WEDNESDAY, 1ST DECEMBER, 1886,

Dec. 1, 1886.

AT THE COURT-HOUSE, COLLEGE-ROSE.

Present:—Sir James Allport (Chairman); James Abernethy, Esq.; J. Wolfe Barry, Esq.; and J. T. Pico, Esq., Commissioners.

S. E. Spring Rice, Esq., Secretary, and W. F. Bailey, Esq., B.L., Assistant Secretary, were in attendance.

James R. Lyle, Esq., J.P., Treasurer to the Grand Jury of the County of Londonderry; Robert Crookshank, Esq., Secretary to the Trustees for the Navigation of the Lower Bann; Mr. David Graham, Superintendent of the Navigation of the Lower Bann; William Eades, Esq., Secretary to the Harbour Commissioners, Coleraine; Joseph H. Oulbert, Esq., Deputy Chairman of the Harbour Commissioners; Captain Givens, J.P., Captain Strang, J.P., Stuart Hunter, Esq., and other Harbour Commissioners, and a number of local traders and others interested in the navigation of the River Bann, were also present.

Robert Crookshank, Esq., examined.

Robert  
Crookshank  
esq.

190. The Chairman.—I believe you are the Secretary to the Trustees for the Navigation of the River Bann?—Yes; to the Trustees of the Lower Bann Navigation.

191. Will you kindly make whatever statement you think desirable with reference to the navigation of the Lower Bann?—I am prepared to give you a statement with regard to the expenses of the navigation, as contributed by the counties of Antrim and Londonderry. That matter goes through my hands. I have here a calculation of the amount of money for each year since

the year 1863, showing the gross receipts, the contributions of the two counties which is part of the gross receipts, and the expenditures. The difference of course between the contributions of the counties and the whole gross receipts is the income from other sources.

192. For what period is that return?—From the year 1863—the gross receipts to the 31st December, 1885, including that year, were £489 7s. 10d. The next item is from the 1st January, 1864, to the 31st December, 1864; for that year the gross receipts were £331 7s. 6d.

Dec. 1, 1884.  
Robert  
Crickenbach,  
cny.

193. How much do the receipts amount to up to the present time?—To the 31st December last—1885—the total gross receipts were £22,371 4s. 8d.

194. That means for the twenty-three years?—Yes. For the years from the 1st January, 1863, to the 31st December, 1885, the total gross receipts were £22,371 4s. 8d. The contributions by the Counties of Antrim and Londonderry, which form part of that sum were during the same period £39,140, and the total expenditure for the same period was £21,174 13s. 10d.

195. Before you go into the expenditure will you state how is the difference between the £39,140 and the £22,371 4s. 8d. made up?—By profits on the navigation—principally by the tolls of the navigation—of course there are other small items also.

196. Have you the particulars?—I have.

197. The tolls practically amounted to £2,331 for the whole period of twenty-three years?—Yes. The total expenses of the works during that time was £21,174 13s. 10d.—that is the gross expenditure. Mr. Lyle, the Treasurer to the Grand Jury for the County of Londonderry is here, and he will be able to tell you exactly what that amounts to on the area of taxation in the two counties. He has estimated it, he tells me, for the last few years, and it comes to about three farthings in the pound on the rateable valuation.

198. Was that the average taxation for the whole of the period of 23 years?—I think he said five years; so that is the expense to the county of Londonderry for keeping up the navigation.

199. What did the three farthings in the pound realise?—That is the average on the valuation for the last five years.

200. Mr. Finn.—Over what area is the charge made?—It is on the ward of the Board of Works. It is a special area. The county treasurer will be able to tell you the parishes and baronies. I am not acquainted with them.

201. When you say three farthings in the pound on the rateable valuation, is it on the special area that you speak of or on the whole county?—On the special area.

202. Mr. Wolfe Barry.—Does any other county than that of Londonderry contribute?—Yes, the county Antrim. I cannot tell you exactly how much, but probably it is something like the same.

203. The Chairman.—Can you speak as to the duties of the trustees for keeping up this navigation, whether they have complied with the obligation imposed upon them?—Substantially I believe they have, but that is more a matter for the engineer to inform you upon.

204. I thought that perhaps you might be able as secretary to tell us?—I have reason to believe that it is so—that they have substantially complied with whatever was required of them, and that they have kept the navigation in as good a state as that in which it was given up to them by the Board of Works.

205. I observe in the evidence that has been given in connection with a Report that has been already made, that the trustees are charged with not having fulfilled their obligations?—I am quite aware of that, sir. We employed Mr. Barton to ascertain the real facts of the case, and I think you have got Mr. Barton's report.

206. Yes, I have?—And of course we consider that Mr. Barton has reported to us the real state of things. He said to us in 1881 that it would take something about £2,500, and we have spent that since.

207. Have you figures to show that you have spent it?—We have—to show the total cost.

208. Can you put them in?—Yes, I have them here: the total expenditure was £21,174 13s. 10d. from 1863 to 1885.

209. That is the total expenditure?—The amount is shown for each year. In 1881 the expenditure was £1,535 11s. 11d., in '82, £1,089 15s. 6d., in '83, £1,710 2s. 6d., in '84, £1,541 10s. 7d., and in the year 1885, £1,274 12s. 6d.

210. That is the total expenditure in each of those years, but you do not distinguish between what is the ordinary amount of expenditure on the navigation,

and what you have contributed towards the obligations you undertook to perform when the award was given?—Of course I can make that out for you if you like, from our half-yearly sheets. But the superintendent will generally be able to tell you what was done in consequence of that report of Mr. Barton.

211. I think it would be desirable that you would give us, not the annual expenditure, but the particulars of expenditure according to the localities in which that expenditure has been incurred. You can do that, I suppose?—I think the superintendent can give it. I will get it made out for you, if necessary.

212. I observe that in Mr. Barton's report he gives a schedule of expenditure, which he considers necessary, probably you have seen it?—Yes, sir.

213. Is it correctly reported?—(Witness is handed the Blue Book containing Mr. Barton's Report)—I could not say, sir.

214. Who can give us information upon that point?—Do you mean the prices that those would cost?

215. No; the expenditure, that Mr. Barton recommended?—The £2,500.

216. Yes?—Our superintendent can give you all that information. He has been working with us for ten or fifteen years, and he knows all about it.

217. The statement which you have put in, showing the total receipts for twenty-two years to have been £22,371 4s. 8d., appears to me to show that you received a very small amount of tolls. I should like to have it analyzed, in order to show the amount of tolls received every year—not the receipts simply from the contributors?—We can give that to you, easily. We are bound to make those returns to the Grand Jury every year.

218. I know. Do you anticipate any considerable increase in the tolls likely to be received in the future?—I can only give you my own opinion. I think there is now a chance for the navigation that we never had before.

219. Why?—Owing to opening the mouth of the river.

220. How long is it since that work has been finished?—Only those last twelve or eighteen months.

221. Has there been any considerable increase in these twelve or eighteen months?—No, there has not been any increase, because there have not been any great number of boats running up the river. The navigation is rather in a tentative state.

222. Are any steps being taken to induce people to put on steamers?—Not yet.

223. Although the works have been completed eighteen months, nothing has been done to increase the revenue?—You only ask for my opinion, and I am giving it to you, sir.

224. You do not know, of your own knowledge, that any such steps have been taken?—I believe not.

225. To increase the traffic on the river?—I believe not.

226. You believe not?—Yes.

227. Mr. Finn.—Is there any increase in the number of vessels coming into the port since the port has been improved?—Yes.

228. Is there a regular line of steamers plying?—Yes, two.

229. How often do they come here?—The Glasgow boat comes twice a week, and the Liverpool boat twice a week also. She is put on this week.

230. How long has the Glasgow boat been running here?—I could not say. I believe ten or twelve months.

231. Chairman.—I believe it was attempted in 1870 to put steamers on?—It was.

232. How long did they continue to?—A short time; two years.

233. That project failed?—It did. It did not pay.

234. Have any attempts been made since?—Not at this end.

235. You are sending yourself to the Lower Barn?—Yes; it is the Lower Barn the whole way to Lough Naugh. There are lighters on the other part, but at the lower part there has been nothing.

232. Can you put in a schedule of the tolls that have been received for the last fifteen or ten years?—Yes, I can give it to you.

237. Can you give me an account of the vessels?—I could not, but I have no doubt that the superintendent will be able to give it to you. He is here now.

238. You anticipate, you say, no improvement in the amount of traffic. Where would the traffic go to?—To the towns along the river. There are a good many towns along the river.

239. What would you expect the vessels to carry?—There is a good deal of Glasgow trade with Coleraine, and that would be extended up the river; and there is a good deal of farm produce, too, going to and from Coleraine.

240. *Chairman*.—Have you made any attempts to encourage the traffic by the navigation, in competition with the railway?—I do not know, sir, that we have. Since the Derry Central Railway was opened, there has been nothing ever done.

241. Was there not a steamer put on?—That was in 1871. That is a long time ago.

242. In each case the attempt resulted in failure?—Yes, sir.

243. Did any railway open in 1871?—No.

244. Then it failed before the railway was opened?—Yes.

245. Do you see any greater prospect of these attempts succeeding now that the railway is opened?—It is a new state of circumstances altogether.

246. The only new circumstance you have mentioned, is that the railway has been opened?—There are other circumstances to be taken into consideration.

247. What are the other circumstances?—The Bann has been opened. I depend altogether upon that.

248. But although that work has been finished eighteen months, nothing has been done?—I cannot say further than that, sir.

249. Mr. Pies.—Who are the owners of the steamers, running from here to Glasgow and Liverpool; are they a local company?—No; they are Glasgow and Liverpool people.

Mr. David Graham continued.

Mr. David Graham.

250. The *Chairman*.—You are the superintendent of the navigation; are you not?—Yes, sir—superintendent of the navigation of the Lower Bann, from Coleraine to Toome Bridge.

251. You have heard the questions I put to Mr. Crookshank, as regards the traffic of the navigation. Can you give the commission any information about that subject?—Yes, sir. I have here a return of the tolls. I supply monthly, a return to Mr. Crookshank. We have in our Secretary's book a return of the tolls which are lifted monthly, from Toome to Coleraine, which I will submit to you.

252. Have you got that book here?—I have, sir.

253. First of all let me ask you what is the amount of the tolls of the navigation?—Well, for the six months it is £44 6s. 8d., from all sources.

254. Mr. Pies.—Six months, beginning when, or ending when?—Six months, ending the 30th November, 1877.

255. What was it last year?

256. *Chairman*.—I suppose you have the return in that book for every half year?—Yes, sir.

257. For how many years?—I suppose for the same number of years as Mr. Crookshank's return.

258. As Mr. Crookshank has gone back to the year 1863, perhaps you would give us the return half yearly, from that date?—(Mr. Crookshank.) They are all there, sir. You want from 1863. (Examines the book.)

259. Yes, from 1863; that is the year for which you commenced your returns of the receipts and expenditure?—(Mr. Crookshank.) Before my time, when Mr. Thompson was Secretary—the 3rd of July, 1863—his commences. They are continuous after that.

260. Does this separate the different sections of the navigation?—(Mr. Crookshank.) I think it does, sir. I think you will find the name opposite each item.

261. I observe, for the half year ending, June, 1880, that the total tolls received were £29 5s. 1d. (Witness—Mr. Graham.) Yes, sir, they sometimes vary, owing to the traffic in fishing boats, and such as that.

262. I observe that in 1881, for the half year ending 30th June, the total tolls were £16 2s. 2d. 1—Yes, sir.

263. And for the half year ending in December, of the same year, it was £31 2s. 9d. 1—Yes, sir, they vary according to trade.

264. That makes a total of £47 4s. 11d., for the whole year?—Yes.

265. That is the year 1881. Now let us see what it was in 1885. I see that for the year 1885, the first half year is only £5, and the second half year £26, making £31 for the year?—Yes.

266. Mr. Pies.—There seem to be only four months in that half year for some reason or other, it begins with February, and ends with May. How is it that

in the first half year of 1880, you have only included four months—February, March, April and May—and then the December half year in June, July, August, September, October, and November only?—There is no traffic in December and January, owing to what we call the winter floods.

267. *Chairman*.—Then this is a true return of the tolls received on the whole year?—Perfectly true.

268. £5 and £26 9s. 2d., making altogether £31 9s. 2d. for the year 1885?—Yes, but sometimes they go to £30 for a half year.

269. Quite so. Then I observe for the first half year of the following year the total of the tolls is £12 15s. 1d. 1—That must be correct, sir.

270. There again I observe that it is less months?—Yes; there is no traffic in December and January of any importance, sir.

271. Can you tell the Commission roughly, or if you have got the details it will be better, upon what these tolls are levied?—On fishing boats.

272. Chiefly fishing boats?—Fishing boats from Lough Neagh. Any fishing boats in the river, and occasionally lighters come down.

273. Do you mean trading fishing boats or pleasure fishing boats?—Both, sir.

274. Can you distinguish between the two?—Yes. I have not put the number of boats from Toome; but I see the tolls levied on Toome, and that shows you that the tolls there are more than from any other part of the river.

275. It would be desirable to give us the amount received from pleasure fishing traffic distinguished from commerce fishing traffic?—I could not exactly do that, sir.

276. But the bulk of the traffic you say is fishing boats?—Fishing boats and trading boats from Lough Neagh. There are a good many trading fishing boats.

277. Mr. Pies.—You say that some lighters come down?—Yes, sometimes. The last lighter was in the summer, and she was bringing a cargo from the bar mouth.

278. Do they bring down many cargoes?—Yes; she brought down a load of coals from Belfast.

279. Does that often happen?—Once or twice in the year. We got two cargoes of coal twice a year.

280. Mr. Wolfe Barry.—What do you mean by trading fishing boats?—The fishing boats trading in Lough Neagh for eels, that bring them to Toome Station, and send them to England and Scotland and other places. There are boats also from the Lagan.

281. Mr. Pies.—How much cargo do those boats carry?—Large sailing boats about two tons; but it is mostly in boxes that they convey the fish.

282. Do they convey the boxes in these boats or in row boats?—They bring the boxes in the boats across the lake.

Dec. 1, 1865.  
Mr. David  
Graham.

283. Is there any firm produce brought down?—No. They would bring bricks and other produce up and down if they had once got it started. There are bricks made along this river, and they would be conveyed from one place to another.

284. *Chairman*.—Can you tell me where we shall find in these accounts the expenditure on the dredging that you have done? Taking the expenditure I find payments for look-keepers, wages of workmen, superintendents' travelling expenses, smith's account, and so on, but there is no item showing what you have spent on dredging?—You will see there, sir, towards the end, the whole expense incurred in the several works for the six months, including dredging and other repairs and for the maintenance of the gates.

285. Perhaps you would point out in this return where it is for the six months of 1885?—I will, sir. There are items for use of vessels belonging to the navigation and wages of workmen for dredging and cleansing.

286. Does it say "dredging" there?—It does not say dredging, but it should be dredging. That is what they are employed for.

287. Have you workmen employed otherwise than in dredging?—No, sir.

288. Then wherever wages for workmen is entered does it mean dredging?—Occasionally we have some carpentry work and some repairs of gates and such things, and they are all put together under the one name; but it is principally dredging work that these accounts are for.

289. Taking now this account for the June half of the year 1885, you say that the item for wages represents the amount spent in carrying out your dredging works?—Yes, sir, it does.

290. *Mr. Pim*.—Do you say that the expenditure for wages is for dredging alone?—For dredging and general repairs.

291. *Chairman*.—Can you distinguish what has been actually spent in dredging from the other payments?—Well, I could not exactly do that, sir. There may be some trifling items for other works independent of dredging expenses, but generally speaking, the principal part is for dredging.

292. Do your accounts distinguish between the ordinary repairs and those which are involved in the maintenance of the dredging?—(Mr. Crookshank.) No, except when any item is entered for particular things; but labourers wages there represents expenditure on the dredging, as they are mostly employed in dredging and other works of the navigation.

293. *Mr. Pim*.—I use an item for coals here?—(Witness—Mr. Graham.) That is for dredging. (Mr. Crookshank.) It is only workmen's wages you will see there, but dredging is the great item of expenditure.

294. *Mr. Pim*.—Is that coal that has been used in carrying out the dredging?—(Witness—Mr. Graham.) Yes.

*Mr. Abewethy*.—Do you keep any return of the quantity of dredging performed?—Yes, I give a return in every six months of the quantity.

Have you got that return?—I have not the return with me, but the secretary can bear me out that I gave him the return.

*Mr. Pim*.—Perhaps Mr. Crookshank could give it?—I expect he has my return. I gave a report every six months.

Is it to Mr. Crookshank you make the reports?—To the trustees in general.

I see here an item for timber—what is that for?—That is for repairing the locks.

295. *Chairman*.—Mr. Crookshank, will you kindly furnish a short return of what has been done towards the navigation—the quantities of dredging—for the last fifteen years?—(Mr. Crookshank.) I have no objection. I am merely the secretary, and have no objection if permitted to do so.

Who could give you authority?—There are some of the gentlemen here who are trustees. I suppose there is no objection to hand over this account to the Commission. [Captains Given, Captain Stronge, and other trustees assented.]

302. *Mr. Pim*.—I use that in Mr. Barton's report he recommended that certain dredging should be done, and specified where it should be done. Has that been done?—(Witness—Mr. Graham.) It has been done.

303. Would those returns that you have made of the quantities you have dredged, show where you have been dredging?—They will.

304. I mean the localities operated on?—Yes, and they will be supplied to you. (Mr. Crookshank.) I can give you the reports of the engineer.

305. *Mr. Abewethy*.—Could you give us a return of the quantities dredged, and the localities in which that dredging has been done?—(Mr. Crookshank.) Yes, I have the returns for the last five or six years. We do not publish them, but I think we have them.

306. *Chairman*.—Will you kindly furnish us with copies of those reports?—(Mr. Crookshank.) I will try to get them for you to-day.

307. Will you also hand in the return of the receipts and expenditure for 28 years, which you have already prepared?—(Mr. Crookshank.) Certainly.

*Mr. Crookshank* handed in a return of the receipts and expenditure of the Lower Bann Navigation from the 1st January, 1863, to the 31st December, 1885, as follows:—

Year ending 31st Dec.	Grain Receipts.	Contributed by Counties of Antrim and Londonderry.	Expenditure.
1863, . .	£ 450 8 10	£ 453	£ 815 8 8
1864, . .	551 7 4	482	886 9 8
1865, . .	474 11 6	486	497 5 8
1866, . .	416 8 8	275	799 17 1
1867, . .	493 1 4	496	496 2 5
1868, . .	1,916 7 9	1,306	3,223 0 11
1869, . .	1,058 10 10	506	1,565 10 1
1870, . .	712 35 6	696	1,408 36 6
1871, . .	416 8 8	696	716 7 9
1872, . .	616 1 4	696	416 12 10
1873, . .	696 8 8	696	696 12 4
1874, . .	343 13 10	506	849 12 4
1875, . .	402 12 10	806	706 12 0
1876, . .	343 13 10	506	796 12 10
1877, . .	506 1 11	796	506 12 1
1878, . .	3,716 0 8	8,606	2,506 12 4
1879, . .	402 10 8	506	3,806 10 0
1880, . .	794 2 5	706	806 12
1881, . .	3,866 14 8	2,506	3,866 12 10
1882, . .	3,866 14 8	2,506	3,866 12 10
1883, . .	3,866 14 8	2,506	3,866 12 10
1884, . .	3,866 14 8	2,506	3,866 12 10
1885, . .	3,866 14 8	2,506	3,866 12 10
Total, . .	39,372 4 5	39,149	24,150 13 10

308. *Mr. Wolfe Barry*.—Who is the engineer in charge of the dredging?—(Witness—Mr. Graham.)—I am the principal; the superintendent.

309. Can you put in soundings?—Yes, I can make calculations.

310. Can you put my soundings in to meet Mr. Barton's figures?—I never have done so, but I have sent Mr. Barton occasionally sections of the river for his own information.

311. You are aware Mr. Barton says that certain parts of the river ought to be dredged to a certain depth?—Yes, sir.

312. Has that work been done, and that depth procured?—It has.

313. Can you tell us what the toll here, from Coleraine to Fooness is?—The navigation toll.

314. Yes?—A farthing per ton per mile, and twopenny per ton for wharves to those that discharge at the quay.

315. Is the railway connected with the quays at Coleraine?—No, they are not connected as yet, but I understand they are going to be connected.

316. Is it likely that they will be connected?—Yes, it is in contemplation.

317. Are there any towns on the river that are served by the navigation and not by the railway?—Yes; there is Killybeg and Portlough. We have a shed at Killybeg for traffic.

318. My question was, are there any towns served by the navigation and not by the railway?—Yes; Portlough.

319. How far is it from the railway?—Seven miles.

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Mr. David Graham.

330. You have spoken of certain boats coming down from the Lagoon: what depth of water do they draw?—5 feet and 5 feet 6 inches, and in summer 4 feet 8 inches and 4 feet 10 inches. That is all the water they have in the Lagoon, but we could have 7 feet all through in summer in the Lower Basin.

331. Chairman.—Would the same lighters ply to the other canal?—No, sir; they have only a small draught. The Ulster Canal is 5 feet 6 inches.

332. But their entrance to the Lough must be the same?—Oh! just the same.

333. Mr. Wolfe Barry.—Have those boats any difficulty in navigating the Lough in stormy weather?—Sometimes they have. They would not come out in stormy weather. They have some boats that could not.

334. Shall you be able to put in any soundings of the places surveyed by Mr. Barton, to show the Commission whether the depth of water required by Mr. Barton has been given?—Yes, sir; I can take a section of any part of the river. I have taken them repeatedly.

335. Perhaps you could send it to the Commission?—I could.

336. And you say you have complied with Mr. Barton's report?—I think so.

337. Would you kindly make your returns fit in with the figures and localities surveyed by Mr. Barton?

—Yes. There is one mistake I must make known to you. There is no specified height of water given in Mr. Barton's report on the sill of the locks. There is no specified depth of water given, and no sections were taken. In any sections that ever I have taken I have taken the depth of water upon the sill at each lock; for instance, we will say the lower gate sill at Toome lock and the higher gate sill at Portna. I do not see any of those specified in Mr. Barton's report or in any other report, consequently it is difficult to follow them out.

338. If you could refer your figures to the Toome lock I suppose Mr. Barton could refer his figures also to the Toome sill?—I dare say he could. In July, 1874, I took the sectional area of the river at Portlough, on this side of the bridge, and found it was about 480 feet.

339. Mr. Abernethy.—What is the navigable depth of the water?—7 feet 4 inches on the high sill at Portna and 9 feet 4 on the low sill at Toome, and the sectional area at Portlough on this side of the bridge was 480 feet. Suppose the river was to rise 4 feet higher, which is generally the height that it rises to in winter floods, the sectional area would be 1,800 feet; so it is difficult to give the sectional area, except you have the specified depth from the sill.

340. What was the navigable depth between these locks at that time?—7 feet 4 inches all through the river.

341. All through the river?—All through the river.

342. Mr. Wolfe Barry.—Mr. Barton says that he submitted 71 sheets of tracings of drawings which are in the office of the Board of Works?—They must be there.

343. I presume these would show the depths from which he calculated. He says that he submitted 71 sheets of tracings of drawings, which are in the office of the Board of Works, containing 422 sections of the river. These I suppose refer to the navigation of the Lower Basin?—I never saw them—I never saw any tracings from Mr. Barton.

344. At any rate, have you not compared Mr. Barton's depths with those which you have taken?—No, I took them merely for my own information to guide me, owing to certain returns that were made, that there was a fall in the river, and I found that it was not so.

345. Chairman.—With whom would these plans be deposited if you have not had them—with the secretary?—I suppose so. (Captain Givens, a Harbour Commissioner)—I do not think the secretary has got these plans. We had certain sections given by Mr. Barton that disappeared. We think that Mr. Barton got them back. I have seen sectional drawings of different parts of the river, but we have not got them now. We think that they were given back at the time that the last Commission sat.

336. Given back to Mr. Barton?—(Captain Givens)—To Mr. Barton.

337. Is Mr. Barton still your consulting engineer?—(Witness, Mr. Graham)—He is, sir.

338. Had you not better apply to Mr. Barton for these tracings?—(Captain Givens)—We have done so.

339. When?—(Mr. Graham)—Yesterday. (Captain Givens)—And even some time ago—some months ago.

340. When you receive them will you kindly forward them to our secretary?—(Captain Givens)—Certainly; but I am very much afraid that we have made all the application we can to get hold of these sections, and we have heard nothing of them yet. (Mr. Graham)—I have seen Mr. Barton submitting some tracings to you in this room, Captain. (Captain Givens)—Yes. (Mr. Graham)—Well, he took those away with him—some tracings; they were large tracings. (Captain Givens)—I am merely giving you my impression from memory.

341. Allow me, Captain Givens, to read for you this part of Mr. Barton's report, which is given in an appendix to the Report of a Commission appointed to inquire into the Navigation:—

"I submit herewith seventy-one sheets of tracings of the drawings which are in the Office of the Board of Works, containing 422 sections of the river. I do not consider it necessary for this report to make nearly so many new sections of the river as these. I have made, however, fourteen sheets of sections, showing 150 cross-sections of the river, and longitudinal sections. I submit them herewith."

That is a report made to you, gentlemen, and I should presume that Mr. Barton had done this?—(Captain Givens)—Is not that a report to the Board of Works?—As far as I individually know, I have seen a few sections or a sheet.

342. This is headed: "To the Trustees of the Lower Basin Navigation." It is dated July 30th, 1881, and is his report to you, gentlemen?—(Captain Givens)—I have never seen anything of the large number that he has spoken of.

343. I think it very desirable that you, as Trustees for the Navigation, should get those?—(Captain Givens)—We have been trying to get them for years, and cannot get hold of them. The great difficulty with us with regard to all those sectional drawings is, that there is no datum to start from—nothing to show how deep the heading is at a specified height of the water. We may measure at a time of very low water, and have different sections to what it is when the water is very high, and we cannot compare one with the other.

344. We consider it very desirable that you should have these tracings to enable your engineer to judge for himself how far Mr. Barton's statements agree with his observations?—(Captain Givens)—I perfectly understand, sir. (Mr. Graham)—Mr. Barton must have all those papers, sir. I never saw them deposited.

345. You stated that you have applied to Mr. Barton for them?—(Mr. Graham)—Yes, Mr. Crookshank telegraphed to him yesterday, and just now, without getting a reply. The trustees, when they were handed over the traffic of the Lower Basin, never got a sectional area of the river, so that the whole thing lies as it was ages back.

346. Mr. Abernethy.—What we want to know is the depth of the navigation between the locks?—(Witness, Mr. Graham)—That is easily ascertained, for I keep a daily gauge book at each lock, and the height of the water can be taken from that each day. I have kept that gauge book since I came under the trustees, which is ten years.

347. You gave the sectional area and the depth of the river: what we want is the available depth of the navigation throughout, in relation to the sill of the lock?—(Mr. Graham)—As the river is at present, from Toome to Coleraine, whatever depth of water is on the sill of the lock, there is that depth of water in the river. (Captain Givens)—There is one of the lock-keepers here, and he can tell how he registers the depth of the water. (Mr. Graham)—He sends me the return each month.

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James  
McKenry.

348. Mr. *Abernethy*.—We want to know the available depth of water in the channel, or what depth is in the channel leading to the locks?—The same at each lock. The head sill of any lock is the point I calculate the depth of water from, from that to the next lock, that shows the depth always.

349. It may be supposed to do so, but does it?—I always found it to be, with the exception of one particular spot, deeper than the sills.

350. One particular spot, where is that?—That is above my lock. With regard to the reengineering, I am there since 1850, and I keep a regular register of the gauge every day.

351. *Chairman*.—Is that on the sill?—Yes, on the sill.

James McKenry, Lock-keeper, examined.

352. How often have you taken the depth of the channel between your lock and the lower locks?—I have never went the whole way, but I have went up as far as Downey's ferry, and the quantity that has been on the lock was the same all along.

353. Mr. *Abernethy*.—But you have found at a certain point a less depth?—Only at one spot.

354. Where is that?—About a quarter of a mile above my lock. It is a few inches less than on the sill for about twelve or thirteen yards or it may be less.

355. You did not take sounding continuously from one lock to another?—Not continuously, but I have done so on several occasions. I tried them as I went along.

Mr. David  
Graham.

Examination of Mr. David Graham resumed.

356. *Chairman*.—Your statement is that along the navigation between the locks there is always the same depth of water in the channel that there is on the lock sill?—With the exception of this one place.

357. Are you sure there is no other exception?—There is none other. I have taken the depth from Toome to Coleraine at different times.

358. How often did you take the depth?—I have taken it three or four times within this last ten years.

359. Mr. *Pies*.—Have you taken it within this last year?—No.

360. Have you any maps of your soundings?—Nothing but the cross sections. It was more for my own information to see how the water stood.

361. *Chairman*.—In addition to that are you not bound to the Trustees to keep the sectional area of the river at the standard that is laid down?—That was the purpose for which I took it, to find out how the river was, and I found that its bottom was less than when it was handed over to the Trustees; as to silling, if there was silling I dredged it out. *Captain Green*.—The bottom of the channel was never handed over to us in the state that the original plans said it should be. Mr. Graham here can state the same thing. On getting our sectional area of the channel there was a great deal of stuff in it that had never been marked, it is not silt, but it ought not to be there according to the depth given to us originally.

362. Mr. *Wolfe Barry*.—That fact is referred to in Mr. Barton's report, in which he says that after making allowance for this fact, there are certainly quantities of excavation that have to be made in the river, and he submits a longitudinal section and 156 cross sections of the river to show where those quantities are to be dredged?—*Captain Green*.—They have been worked at ever since, and with regard to the expenditure on dredging, the expenditure on any other labour than on that for dredging is a mere trifle in the accounts which are sent in fortnightly. The repairing of lock gates and work of that kind are a mere trifle, so that the whole of the expenditure for labour is for dredging.

363. *Chairman*.—Is this the state of things then, *Captain Green*, that in the year 1859 the navigation of the river was handed over to trustees, and that from 1859 to the present time the trustees have not been able to obtain plans, showing what the sectional area of the river at various points was, from that time to this? *Captain Green*.—I will not say that, sir, for I have seen several sections myself. (Mr. *Graham*).—Not from the Board of Works. (Mr. *Captain Green*).—Not from the Board of Works.

364. You have read this report of Mr. Barton's?—*Captain Green*.—I have.

365. He says—"When the Board of Public Works made an award in 1859, and placed in your charge this river, they furnished you with a series of plans and sections, showing the works generally, and the lock works in detail; but no cross sections to show what excavations had been done, or to show the walls and widths, and depths to which each portion of the river has been brought. The award, it is true, gives

in Schedule B, a description of the locks and weirs, and the several breadths of the navigable channels are stated, and their depths are stated to be from 6 to 8 feet, but as regards the general channel of the river there is no description of the work which was done, or of what breadths or depths were then supposed to have been attained." Then there is this important statement—"Consul having advised that you are responsible for the maintenance of the whole river channel, it does seem to have been a remarkable omission that the award describing accurately the navigation works, contains any description of the general river works." This obligation was imposed upon you in the year 1859, and no steps appear to have been taken since with reference to those plans; is that so? (Mr. *Graham*).—I had not joined the trustees in 1859, but I perfectly understand the responsibility of the trustees to keep the river in the position in which they received it.

366. We are not dealing with individual trustees? (Mr. *Captain Green*).—I am speaking of the trust. (Mr. *Captain Stronge*).—I have been a trustee, and I can say that we considered we had no right to do more than to keep the river as we got it; that we were not to take away those impediments to the navigation which had been left by the Board of Works, when the navigation was confided to us.

367. Have you been a trustee since 1859. (Mr. *Captain Stronge*).—I think it was in 1862 that I was appointed, but I do not remember the date. We did not think that we were entitled to embark in any possible work, but that we were merely to keep the navigation as we had got it, and we have been dredging ever since.

368. Mr. *Abernethy*.—But you have no data to show in what state the river was when handed over to you?—*Captain Stronge*.—I was not here at the time. I came a short time afterwards. (Mr. *Graham*).—Those cross sections were taken away by Mr. Barton. (Mr. *Captain Stronge*).—We, all of us, felt the want of those cross sections, so as to be in a position to keep the river as we got it. We knew of places where the water is kept back in consequence of the impediments left by the Board of Works. The water at the time of the greatest floods rose in the Cutts at Coleraine, from one foot to eighteen inches; it was never more than three feet at the time of the greatest flood, and yet, I believe it rose at the same time to ten feet at Glasgow, near Agvevy. We believe that the water has been kept back by the impediments left by the Board of Works.

369. *Chairman*.—Mr. Barton says in his report—that in his opinion you have failed to excavate some 19,632 yards, and in the final concluding paragraph of his report he says that some silt has accumulated which can be removed? (Mr. *Captain Stronge*).—Of course, I cannot give an answer as to those particular plans, but anybody who knows Lough Beg, knows that we may excavate there this year, and that next year you would find it all filled up again. We are continually employed excavating on the same ground year after year.

370. I do not think we need pursue this topic further? (Mr. *Graham*).—I want to say something as

to the sectional area given by the late Mr. McMahon. It was 2,400 feet. That was the sectional area when there was to be 400,000 cubic feet coming over, and provision was made—ample provision—for 2,400 feet of sectional area. Provision was made for that amount, but you can imagine, gentlemen, when one million cubic feet came over that no provision was made for it.

371. Mr. Abernethy.—You are going into the drainage question now.

372. Mr. Pies.—Your chief revenue, you say, are the tolls?—Yes.

373. And they are chiefly derived from fishing boats?—They are.

374. Do these boats come down the river to the railway?—They come to the line of the railway.

375. Then they put out at the railway?—Yes.

376. How many trading fishing boats would be in Lough Neagh?—They have as high as 100 a month coming to Toome.

377. They would not be all different boats?—No, but 100 calls.

378. What depth of water do they draw?—Eighteen inches or two feet.

379. Mr. Abernethy.—When loaded?—Carrying a quantity of fish in them.

380. When they are loaded?—Yes.

381. Chairman.—Do you, gentlemen, as trustees, wish to make any observation? (Captain Gibson).—We shall be very ready to answer any questions that may be put to us. We expected that Mr. Barton was to have been here.

382. We shall find it necessary to call Mr. Barton on our next visit, perhaps not here, but in Dublin. I presume there would be no difficulty, when we examine Mr. Barton, for your secretary and those gentlemen to be present? (Captain Gibson).—No difficulty. We will give every facility that can be afforded.

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Mr. David Graham.

James A. Lyle, Esq., J.P., examined.

James A. Lyle, Esq., J.P.

383. Chairman.—You are the Treasurer for the County of Londonderry?—For the City and County of Londonderry. I have prepared a return showing the rateable value of the area taxed for the maintenance of the Bann Navigation, and the amount paid year by year for the last five years—that is, from 1882 to 1886. The valuation of the taxable area in the County of Londonderry varies from £185,893 3s. in 1883 to £186,881 3s. in this year, 1888. The amounts of the payments made by the Grand Jury of the County of Londonderry were, in 1882, £349 7s. 7d.; in 1883, £393 10s.; in 1884, £492 11s. 7d.; in 1885, £346 6s. 4d.; and in 1886, £377 1s.; total for the last five years, £2,008 13s. 10d. The rate in the pound on the valuation of the taxed area was, in 1882, 1½d.; in 1883, 1½d.; in 1884, 1d.; in 1885, 1½d.; and in 1886, 1½d.

384. Mr. Pies.—Where are tolls first charged to vessels coming up?—The trustees have nothing to do below the Cutts. There are no sea-going vessels coming up. (Captain Gibson).—A sea-going vessel went from Agvee, the first town on the river above Coleraine; she went to Glasgow direct with her cargo. (Mr. Lyle).—But not for several years; they did some ten years ago.

385. Is there an opening in the bridge? (Mr. Graham).—Yes.

386. Is it a swing bridge? (Mr. Graham).—No; they go under the arch. (Mr. Lyle).—There was a steamer that lowered her mast and went under the bridge and proceeded to Glasgow. We have got coals that way.

Mr. David Graham recalled.

Mr. David Graham.

387. Mr. Wolfe Barry.—Mr. Graham, will you give us the readings of the height of the water at the different locks in times of flood?—I can forward them to you.

388. We want them particularly in flood time?—Will twelve months do?

389. We should like it for longer than twelve months,

but only when the river is high?—That is about five months of each year. I can give it, but I will have to go through them. It will take me a week, perhaps, before I can furnish those particulars to you.

390. You can furnish them to the Secretary, at 36 Mansion-square, Dublin?—I shall do so.

Mr. William Ellis examined.

Mr. William Ellis.

391. Chairman.—In any remarks that you have to make, confine yourself, please, to the navigation alone. Do not touch the Harbour Board?—It is merely in reference to the trade that I wish to speak, Sir James. I am a coal merchant, and I have been a ship-owner here for more than twenty years, during which time I have been doing a large business in coals, which is an important branch of traffic in the locality. About the year 1863 to 1867, I had been supplying the locality with from 6,000 to 8,000 tons a year. One of the largest consumers was Mr. Beatty, and he complained of the excessive cost of coal carriage. His consumption was 4,000 tons a year, and he suggested that I should put a steamer on the river. I told him I could not do that, but that I would charter one, and I accordingly chartered one called "The Two Sisters," in, I think, the year 1867, and when she came over the bar—she was about eighty tons—she could not get over the bar until it was the top of the tide or so, and I was then obliged to wait till it was low water, in order to get her under the arch here, and when we took her up a mile ahead she could not get along till the water rose to high tide again.

392. Is it your evidence that the bridge should be pulled down?—If there is to be a sea-going traffic it

should certainly be pulled down, because unloading and reloading and landing them at the works here would cost twice as much as bringing them by the railway from Portrush to a quarter of a mile from these works.

393. I do not see the bearing of this on the evidence that has been given here this morning?—It bears on it in this way, Sir James, that it would be impossible to trade up the river, notwithstanding the success of the harbour works—if it is successful—considering the traffic here. I expressed my opinion before the Royal Commission. I expressed the opinion at that time that it would be at twice the price at least, and the experience of the last four years has proved that my opinion was well founded; because, notwithstanding the sea-going traffic from here to Glasgow, not one single box of soap has passed through, or one ton of coal has gone up the river through the Cutts, nor can they do so. Beyond the usual bringing of goods to Coleraine quay by a vessel, the steamer there would have to wait for the times the tides would suit. It costs more a great deal than what the railway would charge bringing it within a quarter of a mile of the works, and no time lost and every facility in favour of the railway. If you take Killybeg, the next town on the river, it would take

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Mr. William  
Ellis.

temperance to cart them from the wharf on the river, besides twopenny for landing. That, with the cost of taking them away, would be more than the cost of taking them from Portrush to Kilmac, at the rate of 3s. 3d. three. Hence, in the nature of things, there is no traffic on the river there in connection with this seagoing traffic from Kilmac: except men were such dockings in the trade that they did not know the right way of doing it there cannot be. I may land 600 tons of coal at Kilmac; I land them there within a quarter of a mile of the works by the railway at 2s. 2d. from Portrush; but if I take them to Coleraine quay, and take them by water down, it would cost me 2s. more. The other works, if they were going on, would adopt the same course, and would take them by rail. I know the traffic remarkably well, and I never knew an inland navigation to succeed alongside a railway. If you take from Edinburgh to Glasgow, you find no water traffic there, from Port Glasgow to Riddburgh. Again, from Manchester to Liverpool, water traffic is not there, the railways do it all: therefore, if the navigation of the river and these artificial weirs are to be kept up in the river for floating, there is nothing to float on it.

394. Your view would be that, even if the bridge were removed, the traffic would not be improved?—No traffic can pass; in the nature of things that stone bridge would be a complete impediment.

395. Supposing the bridge were removed, would the traffic increase largely?—No; it is impossible in the nature of things.

396. You have nothing to suggest?—The suggestion that I have to put forward is that the conclusion of the Report of the late Royal Commission should be carried out, which would have been carried out, but it was conditional on the consent of the owners, and the people who paid for these works—that is, the Grand Jurors of the five counties through which the work passes—they all consented on the first application save Derry.

397. To what did they consent?—They consented to the navigation being abolished in the interests of drainage. I am clear on that point, Sir James. They did not consent to it, consequently we had to stop carrying it out. We then applied for special legislation, and we were going to have a Bill introduced by the Chief Secretary of the late Government. We did

not allege that the Board of Works made the mistake referred to here, but the circumstances of the country and the trade of the country had so altered that the locks had not discharging power enough to meet with the perpetual flooding of the country, because the material drainage effected an improvement to a great extent, and when the winter came the power of the floods was let go over the Cuts; therefore, if the river in kept up continually full of water, and the floods take place in this way, they will inundate the country and carry away the crops to the sea. But why should that be done, and why should such a state of things be kept up by the three counties at such a large expense, about £1,350 a year. I suppose some years it is £500 or £600 a year on Derry alone. I think that utterly useless, and I consider it a public mistake to keep a useless navigation, and making the people pay for the project to their own destruction. I therefore am of opinion in the interest of trade that if the water was the cheapest method of transfer it would be more availed of, but no man would think to deliver coal by the most expensive route. The railway having interested the country has so altered the course of traffic that this navigation is no longer required.

398. Mr. Wolfe Barry.—Is the railway connected with the quays at Portrush?—Yes. I have got steam cranes there of my own, and the coals are delivered from the vessel and passed into the waggons to go to their destination.

399. Captain Green.—You say you are a coal merchant?—Yes; is not that true?

400. Chairman.—Excuse me. You are not here to cross-question a witness. If you want to give evidence you can come forward and do so. (Captain Green.)—I merely want to show the saltness. (Witness.)—Sir James, I have not a shilling of interest in the Portrush Harbour. I am a simple trader, and I do the business that pays me best. The steamer that was referred to, and was called the Shamrock, was not the Shamrock. She was built by Mr. Barclay, and traded as The Two Sisters. She made a few trips in 1858, and the next year he tried her and he told me that he lost £1,300 on her in one year. He sold the boat, and went back to his old method of doing it, so the Kitty of Coleraine was changed to the Shamrock, and we had no attempt to use the navigation, and I think we never shall have.

Rev. John Finckell examined.

Rev. John  
Finckell.

401. Witness (exhibiting a large map).—If you look at that map there you will see that at a place called Colindale there have been coal mines. There are also a number of places for making pottery wares, and there is regular navigation from them down to Lough Neagh. I cannot really see why even pottery and other things should not be made there, and brought down the river, about fifty-five miles. There is a connected system of canals in England, and work goes on in a variety of goods, which are carried even as far as London, one hundred miles away. There is a fish kind of boat that goes in those canals—

402. Chairman.—We know all that. I do not think it is necessary for you to go into that. If you confine your observations to the navigation, and if you have anything to communicate that may be interesting or valuable in reference to the navigation, we shall be glad to hear you?—I merely mention that as a statement of facts, in opposition to what Mr. Ellis has said. I do not see why hay should not be brought down the river. Great quantities of hay are shipped by the canal.

403. You do not deal in it; these are simply theoretical opinions?—Yes.

404. I do not think that we can enter into theoretical opinions?—You might want to know are the materials ready to be brought down the river.

405. Mr. Finckell.—You say that there are brickworks, are there bricks made in the neighbourhood of Coleraine?—Not at present; but they might be brought down the river.

406. Why are they not brought down?—Because the thing has not been done with energy. In England the railway and the canal go on side by side, and the one supports the other. There are many things that might be brought up the river; for instance, many sorts of lime are brought to Coleraine.

407. Chairman.—That is a question for the trade?—By suggesting these things it brings them out, and our object ought to be to promote both trade and navigation. We have these iron mines, and there are also lead mines in the County Antrim.

408. If the ironfounders and brickmakers and Portrush farmers desire to have some improvement carried on in the navigation, we shall be very glad to hear them, but I really must put a stop to the promulgation of mere theoretical opinions?—It is not merely theoretical opinions that I have been putting forward.

409. I fail to see at present that it would be useful to continue this course?—What I want to impress upon you is, that unless energy and ability are thrown into the thing it will not be carried out.



William Beales, Esq., Secretary to the Harbour Commissioners, examined.

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William Beales, esq.

410. Witness.—I am the Secretary to the Coleraine Harbour Commissioners, and I wish to inform you that this Board has expended about £92,000 on the navigation works of Coleraine and the entrance of the river. About £22,000 of that £92,000, in round numbers, which has been so expended, dates from 1866. £22,000 was spent in the years 1866 and 1867, or thereabouts, leaving a recent expenditure of about £70,000, or, more accurately, £72,400. Of this sum the House of the Irish Society has contributed, in a free grant for navigation purposes, £24,000, and the Commissioners have raised the balance on mortgage, under a guarantee note of 2s. 6d. on the town of Coleraine, and a rate of 2½d. on the two adjoining baronies.

411. Will you more fully explain what you mean by the expression "this money has been expended on the navigation?"—do you mean works in the harbour alone?—I mean dredging works, the erection of two piers at the river entrance, and the purchase of land.

412. To what portion of the whole expenditure do your remarks apply?—The Harbour Commissioners of Coleraine have control of the navigation from Coleraine to the entrance of the river.

413. Mr. Wolfe Barry.—When you say "from Coleraine" do you mean below the stone bridge?—I think we have power between the stone bridge and the Cutts but at present there is no traffic in that part of the river, and we have expended no money on it. The money has been entirely expended between the stone bridge and the bar mouth. The navigation works have ceased about one month ago, but there remains a portion of the works directly connected with the success of the undertaking still remaining for execution, that is the railway connexion between the wharves and the main line of the Northern Counties Railway Company. This connexion will cost about £5,000. £4,000 has been subscribed. The Commissioners are getting a statement before the public to enable the additional money to be raised. This remains for the last, as the dredging, wharves, and deepening of the river are of more immediate importance for navigation purposes.

414. Chairman.—This £25,000 is an expenditure exclusively on the projected communication between the wharves and the railway?—Yes, or joining the line of railway, and the acquisition of whatever lands may be necessary. This money has been secured upon the landing rates, and crumage profits, which the Harbour Commissioners have made over to those who are willing to make the advance. Any profits from the crumage will go with the wharfage rates as a security to those who may lend money for the railway connexion. An agreement has been entered into with the Railway Company for working the line, they obtaining half the gross receipts, and the Commissioners the other half. In regard to the dues on the river before 1879, when the present Commissioners were incorporated, the average receipts were very small—I think £250 per annum. Since 1880 there has been a decided improvement, but nothing like what we ultimately expect when the railway communication is made, and the works are fully completed. Last year the gross harbour revenue, I find, was £1,069 18s. 2d.

415. Can you give us the sums for five years?—Yes, Sir, I can. In 1880, the revenue was £255 10s. 8d.; in 1881, £289 2s. 4d.; in 1882, £397 6s. 3d.; in 1883, £507 19s. 4d.; in 1884, £734 2s. 2d.; and in 1885, to the 31st December of last year, which is our last balance, £1,069 18s. 2d. We have at present steam communication with Glasgow, bi-weekly sailings from Coleraine, and just within the last few days we have made arrangements for a new steam communication with Liverpool. The "Erin" steamship Company have undertaken to put a Liverpool boat on the station with a weekly communication of a suitable character for a cattle and goods trade. The Commissioners expect that this will, with the railway connexion, put the trade of the river in a satisfactory state for ult-

mately developing the trade that naturally falls to the district by its local situation. They consider that the line of country which is spread up by the Derry Central Railway from Cocksand and from Maghallow certainly, will come naturally to this port. The depth of water that we have at the entrance of the river is thirteen feet, and we have a greater depth inside; from the entrance to the town of Coleraine, eleven feet at low water spring tides, thirteen feet at the bar, and inside over eleven feet, with the exception of one small spot in which the depth is about ten feet nine inches. The Commissioners expect, even yet, to be in a position to bring this into uniformity with the rest of the channel, but even ten feet nine inches with a rise of six feet at ordinary spring tides gives us sixteen feet nine inches. A vessel called the "Sirius" has entered the river during summer drawing sixteen feet six. Before these works were undertaken the figure was three feet at the "Bar," and nothing but small coasters of a very light draught were able to get into the river. With regard to the trade that has been spoken of in the other portions of the navigation belonging to the Navigation Trustees, it has to be recalled that there the tide has a good deal to do with the facilities; formerly vessels not being able to get over the "Bar," except at high tide, made it impossible to pass the stone bridge without losing a tide, but such a vessel can now get in at any state of the tide. No doubt the stone bridge would be an obstruction to a certain class of vessels, but it may be possible to have vessels that could lower their funnels or masts and so trade might be opened up beyond the bridge. Upon that and other matters there are persons who will be able to speak more accurately than I am.

416. The Commissioners, as I understand you to say, have undertaken to raise £5,000 to complete the communication between the wharf and the railway?—They are at present raising the necessary money for that purpose.

417. Has that been done in consequence of any difficulties in the navigation?—No, but because we have to take measures towards the development of trade.

418. Then you have no difficulties to complain of in the navigation?—None that I am aware of in our part of the navigation.

419. I am not speaking of the harbour navigation, but of the trade of the Lower Bann navigation; have you had any complaints of the way in which they have been met?—Not as yet, for we have not been able to push forward that portion of our trade. We have provided for the connexion of the port with the railway.

420. Have you anything to suggest that would improve the river navigation of the Lower Bann?—Well, we believe that the works under the control of the Harbour Commissioners will lead to the development of trade by water communication on the Lower Bann, and that the facilities now afforded by means of the harbour accommodation and the improved entrance to the river, will induce many persons to take advantage of it.

421. Quite so, but you still think that your chief difficulties for harbour traffic will be lessened by the railway?—Yes, by the railway, but still a very important part of our trade, we think, can be done by water communication along the river Bann, which has not a very heavy fall—I think only thirty-one feet in twenty-nine miles from Toome to the Cutts at Coleraine—and it is, both for flow of water and depth, admirably suited for the development of water trade. The communication by the river is so practicable in itself that it is natural to suppose it will be largely availed of. Of course there is a part of the trade that will be more naturally served by the railway, but we think that there is a large part which will be very well suited for the development of trade by water in connexion with our present harbour.

422. Mr. Pies.—At what places on the Bann do

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you think it possible that you can develop trade by the river communication with Coleraine?—The towns of Killybegs, Portlough, and Toome are situated on the river, or nearly so; and also there would be a large district round Lough Neagh.

423. Have you anything to do with the steamers running to Portrush: do you know the class of cargo they carry?—Yes, sir.

424. What do they take, and where do they go?—Our ordinary vessels are coal vessels. By the Glasgow steamers we get general merchandise of the ordinary kind; we send out potatoes and oats, and butter and hay, and general farm produce; and cattle form a very important part of our trade.

425. Does much of it come down the river at present?—None; there are no facilities at present.

426. *Chairman.*—With the navigation which is there, why are goods not brought down the river?—We believe that the traffic would come if the principal merchants and traders in Coleraine put their shoulders to the wheel and did something towards placing barges on the river. The obligations that they have been called upon lately to meet have, however, been so heavy that this has naturally fallen to be one of the later things to be done. We think that soon something will be done, when they see that it is their own interest, to do something to promote the water traffic of the Lower Bann.

427. Still that interest that you expect them to exhibit in the future did not operate so as to induce them to support the steamer?—There was not the facility then that there is now.

428. Mr. Fin.—The present tolls of the navigation do not proceed from barges?—No.

429. Are there any barges?—We have no need for barges in the river at present, because the steamer carries goods right up to the quay.

430. I am speaking of the traffic on the Lower Bann itself. Is there any traffic there except in fishing boats?—There is not; at least not that I know of.

431. The Bann Navigation does not provide barges for persons to use; they do not carry goods for traders; they merely provide the river for others to put boats on?—Just so.

432. Was there ever anything done by individuals or by ratepayers to start steamers except the steamer that we have heard of?—No, except the one Mr. Barclay obtained for his own trading purposes.

433. Mr. *Chairman.*—You stated that there is thirteen feet of water at the entrance of the river, and eleven feet within?—Eleven immediately inside the entrance, between the wharves and the town of Coleraine. We have a little over eleven feet as an average. There is one part a little under, but we intend to make it all uniform.

434. Have you thirteen feet at low water at the entrance?—At the entrance, yes.

435. Between the piers?—Yes.

436. And all along inside?—I believe almost entirely inside. The Harbour Master tells me that right away from where the piers begin we have thirteen feet. At the base of the eastern pier we may not have quite the thirteen feet at low water, but the whole length of the western pier, and corresponding with the eastern, we have thirteen feet.

437. But where you have mentioned you have less than thirteen feet?—Yes.

438. Goods brought up to the wharf at Coleraine, you say, may be brought up by steamer?—Yes; we have two steamers.

439. Supposing you have to convey goods up the lower navigation to Lough Neagh, they would have to be transhipped into small vessels?—Yes; certainly.

440. There is railway communication with Killybegs, is there not?—Killybegs has railway communication.

441. And if it be cheaper to tranship goods from sea-going steamers at the bridge at Coleraine, into smaller vessels to pass up the river and along the lower Bann navigation, what is the object of your making this railway connexion from the quay at Coleraine to the Northern Railway?—There is a large portion

of the district that would not be served by a water communication.

442. What part would that be?—Ballymoney and other towns both on the Antrim side and the Derry side of Coleraine.

443. What town in the river navigation is not provided with railway service?—Ballymoney and Cooks-ree, for instance, will do a trade with Glasgow and Liverpool. They have no communication by the river with those places. It would depend on tramway accommodation for a very large traffic.

444. Ballymoney is on the railway?—Yes; many towns on the railway would be served.

445. On the lower Bann navigation, what towns at present are served?—Magherafelt, I think, would be served by the railway partly, and yet that district is in connexion with the Bann, and the use of the water way might be serviceable.

446. You think it would be cheaper to tranship goods than to use large vessels and the railway?—I should think it would for places like Portlough.

447. Mr. Fin.—You think that for those towns you have referred to, it would be cheaper to send goods by water than by railway?—Yes; for a certain class of goods the railway rates would be heavy.

448. How is it, that if the navigation is cheaper, that means has not been availed of?—It is not long since the carts have gone off the road. One might say, how did the carts live, but the fact is that they were employed because the railway rates are high. In the same way, water communication would serve to keep down railway rates.

449. *Chairman.*—That has been discussed?—It has.

450. How long is it since this mode of conveyance by carts was used between Killybegs and Coleraine?—It continued for about two years after the railway was opened.

451. Mr. Fin.—Before the railway was opened did carts travel from Coleraine to Killybegs?—Yes.

452. And that mode of conveyance has been discontinued from Coleraine to Killybegs: why was it that formerly they carried along the road instead of conveying goods by the river?—The reason was this, that it was practically prohibitory to do anything of the kind, because the port for Coleraine at the time was Portrush. They would require to come by rail to Killybegs.

453. Do you mean to say that cartage was done along the road, before the railway was introduced, from Portrush?—No, I beg your pardon. I misunderstood your question.

454. Before the railway was made the traffic between Coleraine and Killybegs appears to have been by cart along the road rather than by boat along the river?—Yes.

455. Is it not to be presumed from this that it was cheaper to move goods by the road rather than by the river?—Yes, it was.

456. Since the railway has been opened it is found cheaper and more convenient than the road, although the road could compete with the canal?—The facilities of our navigation now render the navigation to those towns cheaper than before.

457. *Chairman.*—Can you improve the navigation by the dredge,?—Not in the Lough at the side of the Cutts.

458. Then if it was found that carts could succeed against the navigation, and when the railway opened the carts ceased, what is there to improve the navigation so as to put that system of communication in a better position than it is now?—We have very much greater facilities for getting goods to the town of Coleraine at cheaper rates than formerly.

459. Is it between Coleraine and those places that you have mentioned that the railway runs?—What I was going to say is that there may be means of doing a larger trade at a cheaper rate than a small trade with limited communication.

460. Surely cheap communication with improved navigation would be availed of between Coleraine and Killybegs?—It would depend largely on the bulk of trade

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to be done. If it was small it might not be suitable for the water communication.

461. The tolls do not depend on the quantity of goods sent?—Yes, but the cost of putting goods on the river would depend on the value, and except there was a certainty of departments of the traffic there would be a disinclination to the embarkation of capital in it. The carriage is mostly the carrying of ton by ton; the rate would be that for which a certain amount of trade could be done. We can give it now cheaper.

462. How can you do that?—By the cheapness with which we can get goods into the river.

463. How long have you been in a position to improve the traffic of Coleraine?—We may say that we are not even yet in the position to take the full advantage of the facilities which the port possesses.

464. How long have the works been executed?—They have been ceased only one month ago.

465. But for eighteen months you have been in a position to admit sea-going vessels?—Yes; but the piers were not completed, and although the works were not completed, we succeeded in getting a Glasgow boat put on the station, and the Liverpool boat came later.

466. Mr. Pies.—The Glasgow boat has been calling eighteen months?—Yes.

467. Two days in the week?—Two days in the week.

468. Do you believe it is paying?—I believe that the Messrs. Laird have better profit from that boat than from many other of their stations. I know that when other trade has been going down, our trade has been improving, and we have no reason to suppose that they are dissatisfied.

469. Chairman.—How do you account for the fact, that although this steamer has been on eighteen months, the revenue from tolls has rather decreased?—I do not think until the people of Coleraine do something towards developing the Lower Bann navigation, that there will be any great increase of trade in that quarter, but I believe that when we get the works completed they will find it their interest to increase their own revenue, and to open a trade with that important district.

470. They have been always in a position to do that?—Well, it was a limited amount of trade hitherto, and it was never of a heavy description, but apart from having steam communication now directed to our docks, we are in a position to use goods in a way that we never were before.

471. Has the traffic from Glasgow to Coleraine increased, within the last eighteen months, the river navigation of the Lower Bann?—No; I do not think there is anything done in that way.

472. When you have got the railway connected with your wharves what effect do you expect?—When we get our tramway connection made the ratemakers will naturally look out for means for relieving themselves of the guarantee that they have entered into, and everything they do to increase the dues will increase the traffic, and the promotion of the navigation of the Lower Bann will be one of the first things that will strike them.

473. Mr. Pies.—Where do the cattle and butter and farm produce come from to Coleraine?—Roughly speaking, I would say from the two baronies and the half barony of the town and liberties of Coleraine.

474. Part being in Antrim and part in Derry?—Yes.

475. Does that traffic come down the Bann?—It comes from the country districts all around, for a considerable number of miles all around, and we have large dealers in cattle in Coleraine, some of the largest dealers in the North of Ireland.

476. Are those cattle driven into Coleraine from farms or do they come by the railway?—A shipper could speak better upon that subject than I could do. I believe they come both ways, but chiefly internally. A very extensive cattle dealer is present who can answer the inquiry you have put to me—Mr. Hughes.

477. Mr. Pies.—You stated that there are towns on the River Bann which would have water communication from Coleraine by the navigation?—Yes, sir.

478. Can you tell me what towns those are?—We think Portlough, Killybeg, and Toome. Yes, those three.

479. Those three?—Yes.

480. You do not mention any others?—No, sir; of my own knowledge I do not know of any others that would be so immediately served by the navigation as those three.

481. Can you tell me whether the navigation is interrupted in times of flood?—I believe not, but I cannot say of my own knowledge.

482. With regard to Killybeg, what height is the town of Killybeg above the canal?—I do not know, sir; there is a great rise I am informed.

483. Do you know the relative distances between Killybeg and the railway and the canal?—Killybeg is about a mile from the River Bann, and the railway is some little distance out of the town.

484. About a quarter of a mile?—Yes, I suppose so.

485. Chairman.—One of the roads at Killybeg is very difficult?

Mr. Graham.—They are both hills from the train and to the canal; both are hills and nearly equidistant.

486. Mr. Abernethy.—We were there yesterday. The distance from Killybeg to the railway station is very short?—(Witness) A quarter of a mile by hill, three quarters of a mile from the bridge, with very little decrease in height. There is a hill from the station into Killybeg, and there is a hill from the river up to Killybeg.

487. Chairman.—I think I may state here that we are not intending to take any evidence on the traffic to-day, but simply to hear what the Commissioners have to say in reference to the works and the accommodation they are about to give. The other question is quite a separate point. It is the feeling of the Commission that we would be glad to hear now any of the trustees who wish to make any further observations as to any further works or improvements of the navigation.

Captain Givens, J.P., Harbour Commissioner, examined.

Captain Givens, J.P.

488. Witness.—I have here the section alluded to, which shows the imperfect way in which the navigation was transferred. This is dated and signed by Mr. Barton in 1892. It will give you some idea of the imperfect way in which the navigation was passed over to the trustees. I merely alluded to it this morning.

489. Chairman.—As to the navigation part of our inquiry, it is better if there are any further observations to be made on the harbour works that they be made before we go into this?—I am belonging to the Harbour Board.

490. But this does not affect it?—No, it is as to the navigation trust which you were at this morning. I made the observation that we had not those drawings handed over to us, as they were supposed

to have been. Those are sections which had been taken by Mr. Barton to show the state of the river as it was handed over to us.

491. What we want to get to, what was the state of the river at the time that it was handed over to the Navigation Trustees?—I think that shows it.

492. Would it not be better that Mr. Barton should give evidence?—I think so; certainly.

493. I presume, that when Mr. Barton gives evidence before us in Dublin, someone from the Navigation Commissioners will be there?—If you think it necessary, certainly.

494. I think it very necessary?—I will mention it to the trustees, and I am sure they will appoint someone to go.

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 Governor, &c.

495. In that case whoever comes had better bring these plans!—Very well, sir. They are the only thing we have to go on to show the state of the river when we got it. It is signed by Mr. Barton, and dated by him in 1859.

496. Now, have you anything to say about the harbour?—I would like to impress upon you that there are several reasons why the upper navigation has not failed. As to whatever has taken place here at Coleraine, the part from the Cutts to the bridge of Coleraine has never been touched by anybody. You have to wait for the tide to fall, when there, to get under the bridge, and at high water to occupy the time at the Cutts. That is almost the principal reason that we have never been able to utilize the upper river in connection with Coleraine.

497. What is your suggestion?—A proper channel must be made, sufficient to meet the depth in the other part of the navigation, so that boats might be loaded alongside the steamer here, and every pound of goods taken straight up the river.

498. Mr. Pies.—Is the river navigation only capable of being used at high water?—Exactly as it is now. As trustees we have no power below the Cutts here, close by.

499. Chairman.—Is it not possible for barges to navigate the river, from the Cutts above the bridge to the wharf below the bridge, at low water?—Not at low water.

500. What is the depth of the channel at low water?—There was no channel ever made. The navigation ceased at the Cutts.

501. Mr. Pies.—How far are the Cutts from the bridge?—A mile and a half.

502. Mr. Wolfe Barry.—Do you think that the Harbour Trustees would continue the navigation to the Cutts?—I think the whole district has been extremely taxed and drained, to make these works from the bridge at the mouth.

503. You do not think that the Harbour Trustees contemplate doing more?—I do not think that they intend to do anything above the stone bridge at Coleraine. They might take the risk of it and get a dredge there. The way along the upper waters might be dredged down, as we have done on one or two occasions already, to get a ship away from the lock.

504. Do you think it likely that the Harbour Commissioners will incur the expenditure?—I would not like to say that the Harbour Commissioners would be able to raise the funds.

505. Chairman.—Have you estimated the cost?—No, not that I know of.

506. Mr. Pies.—You have got your powers by Act of Parliament?—Yes. (Mr. Joseph Outhbert, Deputy Chairman.) I do not think there is any power above the bridge. (Witness—Captain Given.) We have no power by Act of Parliament, but I do not think anybody would stop us.—(Mr. Lyle, County Treasurer.) I believe that this Coleraine bridge was built originally with the view to an opening being made in it at some time. There is a part of it that could be easily cut through.

507. Is it not your evidence that unless a better water connexion be made with the harbour, you cannot expect any satisfactory traffic?—I think it interferes, and has interfered all through with the navigation in the river.

508. Who could you expect to do it?—I think the same power that originally established the Bann navigation, and that has finished it further down. What on earth was the meaning of spending a couple of hundred thousand pounds on the Bann above, and to stop at the Cutts, which did not communicate with any place?

509. Mr. Abernethy.—We have evidence that the steamer some years ago passed beyond the bridge!—It was do that still, but it is not a direct communication. They have to go at dead low water under the bridge, and wait for high water at the Cutts.

510. Mr. Pies.—Would you not require a swivel bridge to meet that difficulty?—It can be done by means of a swivel bridge.

511. But you should deepen the bed of the river!—There should be a channel made to use it all down.

512. Are you of opinion that if this were done, there would be considerable traffic by the river?—My opinion is that cross-channel goods being brought to the quay here, could be landed in the towns at the river side at a lower rate of carriage than that for which they are carried by the railway company now, if they could be put into the barges alongside the steamers—that they would get them at the towns at a lower rate of cost than they do at present if such facility of transit as this was afforded.

513. You have towing power of 2s. 6d. in the pound on the town?—Yes.

514. How much are you charging now?—About 1s. 3d.

515. That is the highest?—That is the highest at present.

516. And is there 2½d. charged on the barges?—I do not think any of the barge charges are levied.

517. Were you not to begin making charges until the works were finished?—(Mr. Lyle, County Treasurer.)—As soon as we got the money we were under interest.

518. Did you put the barges under charge?—(Mr. Lyle.)—Yes.

519. They have been paying?—(Mr. Lyle.)—Yes.

520. And you have reduced it from 2d. to 1½d.?

1½d., I think.

521. Chairman.—Can you tell me, Captain Given, why this question of the navigation below the Cutts has never been submitted to any commission?—It has been submitted in the way I am doing now.

522. We find nothing of such a proceeding?—I submitted it myself. I attended in Dublin on the last Commission, and made there the same statement that I am doing now.

523. Mr. Abernethy.—You have stated that, supposing the channel was improved above the bridge, that would enable you to send goods into the towns along the river cheaper than it is done by the railway?—I believe that, supposing there was a communication with the Cutts, that barges could come alongside the steamer and tranship the loads they may bring there, and that they could land goods cheaper in the towns along the river than is done by the railway. There is no doubt about the Kilrea road being a serious obstacle; but all the metals, all the railway rails, and everything of that sort could be taken by barge along the river and carried up to the town and down to the railway at the opposite side.

524. It was before Lord Mease's Commission, I presume, you appeared?—It was.

525. Mr. Pies.—Have the traders made any complaint about the depth at the Cutts being deficient?—It was mooted and talked about. I dare say that gentlemen here who are traders at Coleraine will give you information to that effect.

526. Mr. Wolfe Barry.—It has been stated that £4,000 have been subscribed for the purpose of making a communication with the railway?—Yes.

527. Another thousand pounds are wanted?—Yes.

528. Who subscribed the £4,000?—I would say the traders of Coleraine. Here is the Deputy-Chairman of the Harbour Trustees, who knows about it. I think I am right in saying that the traders of Coleraine have provided that £4,000.

529. Whatever traffic would go from the ships directly to the barges would be so much less to those gentlemen who subscribed that £4,000?—I am afraid it looks like it.

530. Chairman.—Would it not have been better to spend that £5,000 in finishing the navigation?—Well, sir, I cannot say that. I think it is the same thing with the merchandise from Coleraine to the bar mouth.

531. You raised £5,000 to make a communication

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from the terminus of the railway to the wharf. You intended to better the navigation down the port—I consider it most essential for taking advantage of opening from the bar mouth, that there should be a connection between the railway and the wharf.

532. Do you prefer that to the completion of the navigation from the Cutts?—I would, sir, I must say that. I prefer both, but we have been taxed enormously for the making of this navigation, as we all know.

533. Mr. Pies.—Of the Lower Barrow—I am speaking of the higher Barrow, of which I am a trustee. We have paid that, and we think it would be a monstrous thing to recommend where all those heavy works have been finished that they should be abandoned, although they may not affect the depth of the river for a mile or two.

534. Chairman.—Supposing that was contemplated, do you think it preferable to have communication between the railway and the wharf, than the other project?—I must say that I am induced by the interest that I feel for the town generally. I should say that gentlemen representing the town are here.—(Mr. R. A. Taylor). Now, gentlemen, the connexion with the railway would supply quite a different district; we require both.

535. Which do you prefer?—(Mr. Taylor). We prefer both. The railway takes goods to a different district altogether from that which would be supplied by the river.—(Captain Given). When we have got the communication from the quay to the railway, we can send coals at a lower rate to Magherafelt and certain towns inland than they can be sent by Belfast where they principally come from now. It is quite essential to the project of opening the bar mouth that there should be a railway communication.

536. In reference to your evidence before Lord Monck's Commission, there is nothing in it said by you in reference to the completion of the navigation from the Cutts down to the bar mouth. If you like to refresh your memory you can look at the report?—No, sir.

537. Then I return to the question that I have put—how is it that this question of continuing the navigation down to the Cutts is raised now for the first time?—It has been talked of repeatedly, but I cannot say where and how, except that I gave that evidence at Lord Monck's meeting in Dublin.

538. Oh, excuse me; it is not in your evidence. It may have been before some other inquiry?—Oh, no; that is the only Commission that I have spoken to before about this.

Joseph Outberr, Esq., Deputy Chairman of the Coleraine Harbour Commissioners, examined.

Joseph  
 Outberr, esq.

539. (Witness).—I just wish to express the reason why the inland navigation attempts were a failure. A good deal of stress seems to be laid on the failure of the steamer that was put on the river at one time. That failure was due to several causes. In the first place, as has been said already, we had not the outlet to the sea—that was the first cause of failure. In the second place, I believe the steamer which was built for the purpose of trying the navigation was quite incapable of carrying coals or timber; quite a small vessel, and could not possibly but fail. It was an utter mistake—and for that reason nothing but failure could be the result. The reason why, as has been stated, that we have not done anything since is, that the ordinary barges are of no use on the river, steam barges being required, which could only be brought here at a cost of £1,500 each. We are a small community here, and we thought it more advisable to put our whole energies to the opening up of the navigation in the first instance; but I believe now, that the next step for us to take here when we have our hands a little freer, will be to put steam barges on the river on the principle something of the new boats that are placed on Indian rivers, that will draw a small draught of water. We believe that these in trade to be done at Coleraine as the natural outlet for a large district—in fact, the whole valley of the Barrow, and that we can with boats of that class deliver goods at nearly half the cost of the railway. Taking, say, eighty tons, we believe that we could deliver coals at 2s. 6d. a ton.

540. Chairman.—What is the distance that you would convey it?—Thirty-two miles. It costs by railway 3s. either from Portrush or Belfast. I believe that there is no reason why a two shilling and sixpenny rate should not pay for the conveyance of coals.

541. Could vessels of that class navigate from the port to the Cutts?—They could, sir. I do not think the obstruction of much importance as to require much outlay. I think the improvement of the sill at low water would meet all the requirements. There is four feet six inches on the sill of the lock at the Cutts at low water, and I believe that that would be sufficient almost for doing a large trade with vessels of the class named. I do not think that sea-going vessels will ever navigate the river satisfactorily. Then we have

large water power in the river which may be utilized some day by the establishment of factories of various kinds. Then also, we have a large trade that could be developed. Along the shores of Lough Neagh there are immense quantities of hay, large quantities of timber and other produce of various kinds that could be brought as return cargoes down the Barrow in vessels of that class; and we have gentlemen here in the hay trade and the coal trade who will corroborate what I am saying. If there are any questions put to me I will be very happy to answer them.

542. Mr. Pies.—What draught of water would these barges that you refer to require?—Four or five feet, I think, is quite enough.

543. Your contention is that until you have the means of shipping from Coleraine, the traffic on the river cannot be developed?—Yes, and the trade at Kilrea would not support any considerable traffic. Say five tons going up a day; no vessels would go with five tons or ten tons.

544. Chairman.—Five tons a day would supply Kilrea?—I do not think it would.

545. Mr. Abercromby.—What other towns besides Kilrea would be supplied?—There is Portlough and Toome. I do not see why Toome should not be made a depot for the produce from the banks of Lough Neagh.

546. Would it be better to establish these vessels and improve the navigation, than to connect the wharf with the railway at an expenditure of £20,000?—I think they are both essential. For instance the railway connects us with Limavady and Ballymoney. Coleraine is the natural port for these towns, and if we had nothing to do with Kilrea or Toome it would be most important to have a connexion with them. I think that in order to have cheap transmission, it is better not to depend entirely on the railway company. I think it is an admitted fact that monopolies are not for the benefit of any district, and that the more facilities we have for trade the better.

547. Could you answer the question whether there is any interruption of the traffic on the river by floods?—I do not think there is any serious interruption to vessels. The vessel we had was interrupted; there was a difficulty in going against the stream, but that was the fault of the vessel and not the fault of the river.

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Harris, esq.

*Stewart Hunter, Esq., Harbour Commissioner, examined.*

548. (Witness).—I wish to make a few observations. First, sir, with regard to this matter that Captain Given has brought before you about the difficulty of entering the lock, he entirely misapprehends the matter. I wrote to Mr. Graham yesterday to ascertain the depth at the entrance of that lock, and he writes, "that at ordinary low water spring tides there is about four feet of water on the lower sill at the Cutts lock. It takes about five or ten minutes to pass a boat through the lock, owing to the low state of the tide." I cannot understand how Captain Given has fallen into the error, for there is no serious obstruction there, nor on the river between Coleraine and Castlereagh. In proof of this the steamer that was alluded to—Mr. Barclay's—which traded between Glasgow and Agivoy on the river for two years and nine months, navigated the river once a week, and sometimes three times in a fortnight, going under the stone bridge at Coleraine at low water to Castlereagh. Of course she had to wait there until the tide rose to give entrance to the sill, so there was only four feet at low water. There is, I believe, sir, a seven foot channel to the Cutts; at all events it is not less than six feet. With regard to the navigation works, I wish to say why Coleraine has a grievance to complain of. When the Inland Navigation Scheme was brought first before us, it purported to be a navigation from Lough Neagh to the sea. It turned out that it was only a navigation to the Cutts, six miles above the sea. In consequence of want of connection with the sea there could, of course, be no traffic developed on the river. We submitted to taxation, on the understanding that we would have a sea navigation, and the Board of Works, in making their award, made the taxation on the different districts in proportion as they thought they would be benefited—Coleraine being taxed in the highest degree. Seven or eight miles from here people paid the navigation taxation, but were no way benefited by the work done. We say that the removal of these locks and weirs is not warranted, from an engineering point of view. There has been no reliable engineering opinion, I think, placed before the old Royal Commission, or the new one, to show that the mere removal of the locks and weirs would remove the floodings, which these gentlemen up the river have complained of. We say, under those circumstances, that the navigation and drainage should be maintained together, as it was originally proposed. We say that they are not in opposition to each other, but that they would have been mutually assisting each other, if we had had connection with the sea which we now have, and that there would by this time be a large traffic developed on the river. Now when this navigation to the sea has been completed, at an enormous cost to the people of Coleraine, and to the district higher, which has joined with us in completing it, we say it would be monstrous, that having

done all that we have done, the upper navigation should be removed without the most stringent reasons, and we say that there has been no reason shown for the destruction of the inland navigation works such as they are. Altho' there has been made to competition by the railway. I think this is a kind of thing that is recognised at the other side of the water. In England they are making large canals inland, at Liverpool and various other places.

549. The Chairman.—It is not worth while your enlarging on that point. But how do you account for the condition of this navigation, the total tolls received for twelve months being £501—I think that is accounted for by the navigation to the sea being well yesterday, so to speak, non-existing. I had a good deal to do with the getting up of the Kitty. We thought it a pity that the river should remain idle, and we thought it utterly impossible to put on any boat to pay, until the navigation was completed. Then we thought it would be as well to make the expenditure, more to show the necessity for completing the navigation than anything else. I went out with a gentleman through the town, asking people to subscribe for the purchase of a steamer, at a cost of £5,000. The project was to put on a steamer, not less than twenty-five horse power and three barges. We got £1,800, and some gentlemen purchased only a steamer of about twenty tons, with ten horse power. There was a considerable traffic done by that little boat, but here was our difficulty, we had no outlet for any large trade. We had then, sir, to dispose of the produce that would come down the river, to cart and send it to the railway or Portrush. Now, all that difficulty is removed. We have only to put steam barges on the river, bring them along the side of the vessel, put the goods from the vessel into these barges and convey them up the river. All that we import from all the world, we can carry up to all parts of the country, and all the produce that comes down can be transferred to sea-going vessels in the same way.

550. Can three barges go together through the lock? —They cannot go all at the same time. It is about 130 feet long. There would, perhaps, be no difficulty in two going in together; if it took five or ten minutes, there would be no difficulty in taking them through. I think we should also keep in view these waterfalls. Electricity is certain, I think, to be the motor power of the future, and here are the means of generating a power that may be available at long distances from the river.

551. Mr. Fife.—You said you had to pay a heavy tax at Coleraine, in connection with this navigation? —We are taxed in the highest degree for these works. I do not know exactly what the amount of the tax is.

The Commission adjourned.

#### FOURTEENTH DAY.—THURSDAY, DECEMBER 2ND, 1886.

The Commission inspected the Drainage Works at Enniskillen and on the Lower Lough Erne below that town.

#### FIFTEENTH DAY.—FRIDAY, DECEMBER 3RD, 1886.

The Commission visited the Drainage Works on the Upper Lough Erne.

## SIXTEENTH DAY.—SATURDAY, 4TH DECEMBER, 1886,

AT 36, MERRION-SQUARE, DUBLIN.

Present:—Sir James Alport (Chairman); James Abernethy, Esq.; Joseph T. Pitt, Esq.; and J. Wolfe Barry, Esq., Commissioners.

Lieut-General E. H. Stanley, C.B., examined.

552. *Chairman*.—We have received your paper, General Stanley. Would you take it again so as to get it on the notes of the minutes of evidence?—Yes.

553. You will kindly state what you wish as regards the Shannon?—That is as to its general state. I shall not read the report itself but merely give you the general substance of it.

554. The substance of it; quite so, and then we shall attach the paper in an appendix?—Yes.

555. I think that probably if you were to give us shortly the history of the works—a short statement of the present condition of the Shannon—it would be desirable. Would not that be the best mode of getting the substance of this paper?—I can give a short summary, of course, of the memorandum.

556. And then these gentlemen will, probably, put questions from an engineering point of view in reference to the paper?—Yes. The Shannon Commissioners were appointed under the two Acts of the 5 and 6 William IV., cap. 67, 1835—and the 2 and 3 Victoria, cap. 41, 1839. The first Act appointed them to inquire into the then condition of the river Shannon, and prepare a scheme of works which would improve the navigation particularly, and if possible to include a certain amount of drainage; the second Act empowered them to carry out the work so proposed. The surveys made by the Commissioners showed that at that time 34,700 acres of land along both banks of the Shannon were subject to inundation.

557. Mr. Wolfe Barry.—That would be in 1839?—Yes; but in the course of their examination they arrived at the conclusion that it would be impossible to impose any direct charge upon drainage, so from the irregularity of the floods and other circumstances it would be impossible to impose upon any particular area a charge for drainage, without being open to objections which they thought it would be difficult to deal with.

558. *Chairman*.—That was the result of the Commission?—Yes.

559. Mr. Wolfe Barry.—Can you say what the other circumstances were which caused the difficulties?—The other circumstances, no doubt, were the opposition that would be certainly offered wherever they attempted to prove a specific charge, as although a certain amount of land might be virtually freed from flood, it would be difficult to show the proportionate amount of immunity given from flood as a permanency.

560. *Chairman*.—Did they come to the conclusion that supposing the Commission had found it necessary to impose a charge on the owners of land they should confine it to the land affected by the floods, or to the land generally of the flooded districts?—Exclusively to the "flooded area."

561. They confined the charge exclusively to the "flooded area"?—To the "flooded area," and that would also include a slight margin above for the portion liable to saturation.

562. Mr. Abernethy.—That would not be included in the 34,700?—No.

563. *Chairman*.—Do you know what additional land it would include?—That was all that was shown. The Commissioners did not go into the valuation at all.

564. Did you ascertain the quantity?—This (producing the ordnance map of the river) was the survey that was made by the Commissioners, of which we have got details (showing the 34,700 acres), that is to say, the actual amount was 33,500, but this excluded 2,200 acres lying between Portumna and Wolfe-Island which was not surveyed.

565. Then the 34,700 acres do not include what you term the "saturated land"?—It did not, so far as I have been able to ascertain.

566. Are you aware of the contents of the "saturated," apart from the "flooded," lands?—I will come to that immediately in connection with the valuation. A subsequent inquiry was made by Mr. Bateman in May, 1862.

567. Mr. Wolfe Barry.—Is not that 1863?—May, 1862. This is the inquiry (showing report).

568. Mr. Barry.—The Report was in 1863?—Yes; and in a valuation which followed upon that—made jointly by Messrs. Bessington & Gale and Mr. Lyman, in 1868—it was shown that 21,500 acres were still subject to inundation after completion of the Shannon works, which, making allowance for a saturated area of 3,120 acres, brings the total to 24,620 acres. The area actually shown to have been relieved by the work of the Shannon Commission amounts to 13,200 acres.

569. Mr. Abernethy.—Out of the 34,700; that is, consequent on the works?—Consequent on the works, there was actual relief afforded to the amount of 13,200 acres.

570. Mr. Barry.—That is prior to Mr. Bateman's report?—That was the valuation of 1862.

571. Mr. Abernethy.—That was consequent on the works carried out by the Shannon Commissioners?—Yes.

572. Mr. Wolfe Barry.—Prior to Mr. Bateman's report?—Yes, consequent on Mr. Bateman's inquiry. A valuation was made by Messrs. Bessington & Gale and Mr. Lyman, and it was proved then that 13,200 acres was the total quantity relieved.

573. Quite so; that is up to 1864?—Yes.

574. Mr. Pitt.—Was this land that in 1865 was found to be saturated—3,120 acres—part of the 34,700 acres that had previously been inundated?—I do not think that there was any portion of the saturated land included in the 34,700 acres; it was merely inundated land. The survey was not apparently made for purposes of valuation, but simply to determine the quantity of land actually subject to floods. I was coming to the valuation. For this purpose it is usual to make an allowance of about four feet above the inundated land for saturation, according to the slope of the ground and other circumstances.

575. Mr. Abernethy.—Four feet above the level of the inundated land?—Generally.

576. Mr. Pitt.—These two figures—2,200 and 33,500—make up the 34,700 acres?—Yes. Mr. Bateman made two reports—of the 7th May, 1863, and 7th June, 1867, respectively. He aimed at freeing the lands on either side of the river entirely from flood, excepting in cases of great floods of water occurring at long intervals.

577. Mr. Wolfe Barry.—He would have aimed, therefore, at freeing 24,620 acres?—He would have freed the whole of the remaining 21,500 acres.

578. And, in addition, the saturated area?—The saturated area would follow.

579. That would make 34,700 altogether?—Yes; he would have freed the whole of that 34,700 acres shown to have been under inundation previous to 1839.

580. He would have freed the balance remaining of the total 34,700 acres?—Yes.

581. The total is 34,700 acres; up to 1865, 13,200 acres had already been freed, and the balance remain-

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ing was 21,500 acres, and that is what Mr. Bateman aimed at freeing!—Quite so. The estimate for his work was done upon £300,000, and the Government, in consideration of the serious complaints that were preferred by the landholders, decided on introducing a Bill.

582. That was the 37 & 38 Victoria?—Yes; the 37 & 38 Victoria, cap. 60, of 1874.

583. Mr. Pies.—Was the Act actually passed?—Yes. In Section 3 it provides that, on the certificate of the Commissioners, out of the funds, £150,000 should be expended as a free grant on the Shannon improvements as projected by Mr. Bateman, if the riparian owners would allow their properties to be charged to a similar amount.

584. Chairman.—That is section 3?—Section 5. Each sum was to be charged on the lands relieved and otherwise improved.

585. Mr. Pies.—How did it provide that the £150,000 should be charged?—Assents were to be obtained for this £150,000, and with a view to that meetings were held by two members of the Public Works Commission, appointed Commissioners under the Act, at different points along the Shannon, and evidence was heard by counsel and otherwise, the result being that the owners objected to the arrangement, as in some cases the cost would have been equivalent to, or in excess of, the fee simple of the land itself.

586. Chairman.—Was that valuation of £150,000 confined to the flooded area, or did it include the saturated area, or did it go beyond and include the land about four feet above the saturated area?—I think perhaps Mr. Penny, who is here, will be able to give you a better idea of what amount it was; but so far as I have been able to understand, it meant the amount of lands shown to have been injured, according to Messrs. Benington and Gale and Mr. Lysons's estimate. The lands were to be charged for the whole £150,000.

587. Mr. Abernethy.—That is the 21,500 acres?—The 21,500 acres; the amount really, taking in the saturated area, is 24,420 acres.

588. Mr. Wolfe Barry.—That is something like £6 6s. an acre?—Yes, and it was considered to be equivalent to or even over the value of the fee simple of the land in many cases, consequently the assents were lost, and the Act would have fallen through entirely had it not been that the Government decided to take up certain of the most important features in Mr. Bateman's scheme, and sanctioned the construction of the sluices connected with the various weirs along the river, and more particularly the excavation works at Meelick for affording a better discharge section to the river.

589. Mr. Wolfe Barry.—Was there any Act of Parliament required for these works?—The expenditure was sanctioned by the Treasury, dependent on Parliamentary vote.

590. No other Act was required?—No.

591. Mr. Abernethy.—Could you speak generally of the various works that were carried out under Mr. Bateman's report?—The works were the construction of sluices at Killybeg with thirty-six valves, six feet by six feet in the clear; at Meelick of thirty valves; at Adhams of fifteen; at Tormontbury of twelve; at Bony of twelve, and at Jamestown of twelve; all of the same dimensions, with very heavy cuttings at Meelick, the total cost of all the works being £28,757.

592. These works are suspended now?—They were completed in 1883.

593. That was the actual cost?—Yes, that was the actual cost, £28,757.

594. Mr. Pies.—Does that amount include both the sluices and the cutting at Meelick?—It includes everything.

595. Mr. Wolfe Barry.—Could you tell us at all what the cuttings at Meelick cost out of that £28,757?—I can not able to quote it separately.

596. Mr. Abernethy.—You can get it, I suppose?—I can get it easily; it is a matter of account. I should now mention that the enquiry held by the Commissioners appointed under the Act, brought out distinctly two points which I have mentioned here in my memorandum; first, what I have already adverted to, that the charge on the land would in some cases be equivalent to or even exceed the fee simple of the land itself, and second, that while drainage generally was desired, the landholders desired to have the use of the floods, in winter particularly, in order to improve the soil, and that although they would have been willing to pay for proved improvements, still that they could not deprive themselves of the use of those floods; what they principally wanted was freedom from flood in spring and autumn, especially the latter.

597. They wanted to prevent them?—They wanted to prevent these floods, and if they did occur, to get free of them, with a view, no doubt, to save the lay crop at this season.

598. Mr. Wolfe Barry.—How late in the autumn would that be?—Up to about end of September. The heaviest recorded flood occurred in August, 1861, which has been especially adverted to in my memorandum.

599. Mr. Abernethy.—When were these works, including the cuttings at Meelick, completed?—They were completed in 1883.

601. What has been, so far, the ascertained results as regards the suppression of floods since the completion of these works?—I have got here a careful analysis of the results of such at the different points for the last three years (showing figured statement in memorandum).

602. Chairman.—At page 3?—At page 3 is first given the average of eight years prior to the work carried on by the Shannon Commissioners; secondly, twenty-eight years' average after their works; and lastly, three years from 1883, which show, for each of the different sets of sluices in succession, what has been the average number of days' flooding of the lands immediately above. The crucial point will be the number of days for the four months from June to September, as these are the months in which the landholders wish to be freed from flood. The numbers, for instance, for Jamestown show an average of  $2\frac{1}{2}$  days' flooding before the works were carried out; that was reduced to an average of  $\frac{3}{16}$  of a day for twenty-eight years after the works, and there has been no flooding for three years since the sluices have been in action.

603. Mr. Pies.—That is for the four summer months?—Yes.

604. Mr. Wolfe Barry.—It might be put at the head of these columns, "average from '34 to '41"?—I think it would be an improvement; it would be rather with '33 or '34 it must commence, up to '41.

605. It speaks of works carried out between '41 and '50.

606. Mr. Wolfe Barry.—It would be more intelligible if we had the dates?—There will be a break while the works are being carried out. I think I had better supply that separately.

607. Mr. Pies.—If the actual years that were taken up were put in there, it would make them regular?—Quite so.

608. Mr. Pies.—When you say there must be a reservoir, is it lying above Jamestown?—Yes, lying above. Taking the effect at Jamestown, without going through all the others, it may be sufficient to give the effect at Killybeg, which is the most important point. The average of eight years prior to the Commissioners' works was 19·4 days subject to flood per annum—that is, previous to the works of the Shannon Commissioners.

609. The Chairman.—You will find at the bottom of the page, in the last line in the table, 19·4 and 5·61—Twenty-eight years' average after the works had been made, gives only one day during the three years in which the sluices have been in operation, so



that the effects of the works done by the Shannon Commissioners and the subsequent ones have not been confined to merely freeing the 13,000 acres which used to be under inundation before, but they have released, in a most material degree, the flooding of all the remaining area—that is to say, as regards the duration of floods. During those three years it may be mentioned that no very heavy flood has occurred in the autumn, although in 1883 we had in February the heaviest flood that has been known in the Shannon for forty years.

610. I observe that in 1883 it was 131; that means 131 days, I presume. You give here in the corner at the very bottom, 1883, 151; 1884, 96; and 1885, 94. Yes, the average was 84½; that was due entirely to the fact that in February, 1883, the heaviest flood occurred in the Shannon that had been known for forty years, and distributing it over the year raises the average.

611. That was in 1883 to—1883 was the heaviest flood—the 15th February—and that has raised the average; but that was, as you observe, the number of days that all the alluvies were flooded; but the next is for the summer months, for which there is only one day during those months.

612. There is pretty much the same falling off each year. In 1883 it was 131 days; in 1884 ninety-six days, and then it fell in 1885 to twenty-six days, so that the reduction in 1885 as regards 1884 is in the same proportion as the reduction in 1884 from 1883. —Yes, but the fact is that three years' average is a very short time upon which to establish any rule.

613. That is just the point I wanted to bring out. I have mentioned that in my memorandum. I say therein that three years' average is too short a time on which to base any accurate deduction.

614. May I ask you, in considering how the land should be taxed for the payment of that £150,000, was there anything mentioned or any inquiry made as to the desirability or otherwise of taxing the lands that might be supposed to be affected?—I do not think that question had arisen.

615. Mr. Fins.—Did those lands which are relieved of flooding still remain saturated, do you think?—Of course wherever there is flood there must be a certain amount of saturation, depending a good deal on the slope of the ground and the character of the soil.

616. You have succeeded in preventing in the summer months almost any flood. Did the water just come up to the edge of the land without going over it?—Yes, in several parts, particularly below Athlone, where there is very low-lying land.

617. When you say that on inquiry it was found the cost would be between £8 and £6 5s. per acre, and that that was equal to the fee-simple value of the land, was that the average over the whole, or was it that in particular cases it came to be more than the actual value of the land?—The £150,000 was not in any way a valuation. It was simply that Parliament decided to pay for the improvements £150,000 if all those immediately interested in the lands would come down with another £150,000. But in no sense was it a valuation.

618. I do not mean that. But you say that when the landowners looked into the question they declined to allow themselves to be taxed, on the ground that the sum required would, if levied on them, be equal to the whole value in fee of their land. What I am asking is, was it that the average value of the land throughout was so low, or was it only in individual cases?—It is the average simply. I do not know whether they went into any attempt at distributing the amount required.

619. That is a very low value.

620. Chairman.—Can it be the value of the fields that would be operated on simply?—That was their representation.

621. Mr. Abernethy.—Mr. Bateman recommended embankments at certain sections of the river?—Yes.

622. None of this has been carried out?—He mod-

ified a good deal his original scheme. His first report dealt with Clonsilla and other places which he afterwards gave up. I may as well mention that the whole of the Limerick and was supposed to be out of his scheme—at least out of the scheme of the £300,000, as the quantity of land involved was shown only to be 666 acres.

623. Chairman.—Pardon, if you please. I think we have got the main points now of the history?—The proposal then is to see whether looking to the large amount of money that would be required if Mr. Bateman's scheme were fully carried out, and also the effect that has been produced by the construction of sluices and other works at Meelick, whether a certain additional sum for works in very much the same direction, coupled with certain regulations as regards dealing with the navigation depth, might not produce results which would be so valuable as to admit of a compulsory rate being put on the whole of the lands that were subjected to flood before the Shannon Commissioners commenced their work—a compulsory rate which would be only equivalent to a third of what the proved value of the complete relief would be equal to. The amount of cost of the works that are proposed is £100,000, of which I have endeavoured to show in my paper that £50,000 might be fairly charged on the whole of the area relieved—that is to say, 34,700 acres—while the Government might, if they saw fit, meet the remaining £50,000 by a free grant, much on the same principle as was proposed in the Act of 37 and 38 Victoria, cap. 80, which was not carried out.

624. Have you ever had any evidence as to the improvement in a sanitary point of view of the whole district, not only the flooded and saturated lands, but also the districts higher up?—No; I have had no evidence of that.

625. It has not been discussed?—It has at times been generally discussed, but not with any reliable facts. It is a difficult subject, that of the sanitary condition.

626. Mr. Abernethy.—Have the lands above the saturated lands been at all drained?—Several districts of the Shannon have been drained.

627. Having regard to the fact that in consequence of that drainage of the uplands the water discharge in the flooded districts is more rapid than formerly, and having regard to the comparative influence of decreasing the floods, do you not think that the lands within the whole area should be taxed more or less in proportion to their distance from the flooded district?—Are you alluding to those immediately in the flooded district, or above the flooded district?

628. Above?—The subject is a general one. I have a general feeling myself that they ought to be taxed, but I confess that, if I am asked for any further reason, other than on the grounds that the health of the population ought to be improved by freedom from floods, I have not got any specific facts to give you.

629. Chairman.—Have you considered the recommendation of the Orielton Commission that the uplands should be taxed?—I think that there is no doubt whatever that where a better outfall is afforded to towns along any large stream—the Barrow and Shannon, or any streams of that class—the town populations, by obtaining a better outfall for their drainage, should be taxed.

630. And it is your opinion that that taxation should apply to the Shannon and the Bona, and any other flooded districts, as well as the Barrow?—As regards the towns, certainly, in proportion as their outfall is improved.

631. Do you confine your answer to the towns?—Yes.

632. Would the principle not apply generally to the uplands: would it not apply generally, in point of fact, to lands that would be affected beneficially in a sanitary point of view?—I think unquestionably the general health ought to improve when an entire freedom from floods is established.

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632. Consequently, they should be taxed in proportion to the benefits they derive?—It would in some degree depend upon the proximity of the flooded lands or otherwise. Those at great distances, of course, would be less benefited.

634. Mr. Abernethy.—Having regard to the effect on the crops at certain portions of the year of a better climate, and the facilities for gathering in the crops, do you think that they ought to be taxed on that account? Complaints are made that at certain times of the year the crops do not ripen—the result of drainage would improve that: do you think, therefore, that those lands ought to be taxed in a like degree to that in which they become benefited?—I think no doubt their direct interest is in freeing the flooded lands, and that their health ought to be improved, and everything improved, by it. However, I do not know that I could go further than that.

635. Mr. Wolfe Barry.—You proposed to spread the cost over 34,700 acres?—Yes.

636. Out of this 34,700 acres, a certain number of acres have been already relieved, and the balance was 21,500?—Yes; but they have escaped; there has never been a charge qua drainage; and therefore I would include the 13,500 acres that have been freed. They, in fact, enjoyed complete immunity from any charge for drainage, and therefore I would add them on.

637. You would then be charging land which would receive no benefit from the intended works costing £100,000, except these intermediate benefits?—Yes, as they have escaped all taxation for drainage.

638. Mr. Abernethy.—And they have improved undoubtedly?—Yes, and they ought to pay for the improvement.

639. Mr. Wolfe Barry.—That is going away from the principle, that only the lands relieved from floods should be charged, because these lands will not be relieved by the contemplated expenditure?—It is only a small proportional charge.

640. Mr. Abernethy.—They have been relieved by the works?—They have.

641. Mr. Wolfe Barry.—No doubt?—And have not paid for the benefit.

642. Chairman.—I think we have got General Sneyd's views on the point.

643. It may be five per cent., whereas the flooded lands might be charged twenty, and the salted lands ten, and the upper lands might be charged three or four or one per cent.?—That would be a matter of detail, but the general incidence of charge would on an average be no more than one shilling and sixpence per acre per annum, terminable in thirty-five years.

644. Mr. Abernethy.—Over what area?—Over 34,700 acres.

645. Mr. Pies.—Have you heard anything since these works have been carried out, three or four years ago, from the owners or occupiers of the land, as to whether they are pleased with what has been done, or as to whether they are dissatisfied in any way?—We have had at times—very rarely—complaints. Whenever there is a flood that touches the interests of the owners we immediately hear of it in the office; and in October we had a demand for compensation from occupiers of lands near Jamestown. We also have had at the same time complaints from people below, on the grounds that the sluices have been working imperfectly. As a fact, the sluices are worked most carefully, the valves being opened as much as possible in advance of a flood, so as to keep down the water level, till the flood comes down and overpowers the whole machinery. If the flood rises further it must have its way.

646. Mr. Abernethy.—In many cases would not those lands be rescued from flood by very slight embankments?—I mean those lands from which the complaints have been received that you have referred to?—I think that is a question that may possibly come up when the proposed works have been carried out. I do not think it would now occur, because the sluices

are overpowered in severe flood; but I think as we gain a mastery over the flood the embankment of some of the very low-lying land might become a question for consideration.

647. Chairman.—Beyond the statement that we have here in page 4, as regards the lowering of the level, have you any further remarks to make?—No. I think that I have said everything in the memorandum that I wished. As regards, however, one particular point, viz., that at present there is no legal authority to deal with the navigation depth, I have drawn up a separate paper for the information of the Commission, dealing with the question.

648. That paper is in addition to one which you have already sent us?—Yes; I shall be glad to put it in now. A depth of not less than seven feet having been maintained hitherto on the lock sill at Killaloe, it has been thought advisable to take counsel's opinion as to whether, without fresh legislation, it would be possible to reduce the navigation depth to six feet, or to any other depth. I have referred the matter to counsel, who states, after some preliminary remarks, that he considers the Commissioners have no legal right to reduce the depth, under the 42nd section of the Shannon Act—the 2 & 3 Victoria, cap. 61. The section adverted to lays down that the Commissioners for the execution of that Act shall have full power to "widen, deepen, cleanse, clear," and so on; and counsel's opinion upon that is to the effect that further statutory powers are required, no powers being given to lessen or diminish the existing depth of water.

649. Mr. Pies.—What was the depth originally fixed at?—In the Parliamentary plans of works to be executed, submitted by the Shannon Commissioners with their Report, dated 9th December, 1837, the depth at which they proposed to maintain the permanent level of the navigation was six feet on the lower sill of the Hamilton lock, at Moelick. It was afterwards stated by Sir Richard Griffith, in his evidence before a Select Committee of the House of Lords, that considerable modifications were made by the Shannon Commissioners, particularly at Killaloe, where the original estimate proved insufficient, owing to the existence of rock to a much greater extent than had been anticipated. They found the expense so great that it was impossible to carry out the works as originally designed within the amount sanctioned by Parliament.

650. Mr. Wolfe Barry.—Is there any means of showing what the level of the sill at the Hamilton Lock was?—Yes, that has been determined.

651. Therefore the navigation depth would be the Parliamentary level?—It is shown on the plans as six feet.

652. Mr. Abernethy.—Above the sill?—Yes; six feet above the lower sill of the Hamilton Lock at Moelick.

653. Mr. Wolfe Barry.—Could you give us the level above the lock?—Yes.

654. Mr. Pies.—Did they, owing to the difficulty at Killaloe, not give six feet anywhere there?—Owing to the difficulty of the rock, they increased the height of the Killaloe weir slightly to compensate.

655. What depth did they get?—They succeeded in dredging out a certain depth down to the rock with some of the latter. Sir Richard Griffith's evidence goes to show that they had two of the largest dredges then constructed employed for the works.

656. Have they got six feet at Killaloe now?—The height kept up on the lock sill at Killaloe is always seven feet, or a little more.

657. Mr. Wolfe Barry.—Could you tell us whether that height is higher than the depth arrived at by adding six feet to the level of the sill?—It is practically one foot above the datum—seven feet now where six feet was the depth.

658. Does counsel therefore advise that that depth has gained such right by prescription that it cannot be altered now?—That is his opinion—that the Commis-

gates having got the power to widen and deepen, have no power to go back and diminish.

659. I gather that the sill of the lock is higher than the prescribed level given to Parliament; that six feet added to the level of the sill gives one foot higher than the height in the original scheme laid down in the Parliamentary plan, which was six feet?—The improvement proposed in the plans submitted to Parliament was to construct a weir at Killaloe, above the bridge, 1,100 feet long, with crest six feet over the lock sill.

660. Can you give us the level of the lock sill above Ordnance datum?—Yes; sixty-seven feet.

661. Ninety-seven above Ordnance datum?—Ninety-seven feet would be the height above mean low water at Limerick.

662. That is not Ordnance datum?—Above the Ordnance datum, 274 feet.

663. I want to know what the statutory height of the lough is by inference from the Ordnance datum?—I have given it as ninety-seven feet. The total surface full of the water is ninety-seven feet from Lough Derg to Limerick.

664. I do not know whether I make myself clear; what I mean is, there are certain Parliamentary plans by which the sill at Hamilton Lock was shown; I wanted to know whether upon these plans it was shown to be a certain height above some fixed datum such as Ordnance datum, so that it could now be referred to the same datum?—There is no Ordnance datum shown. Here (showing plans) is the Parliamentary plan, and here is the proposed sill of Hamilton Lock.

665. Mr. Pies.—The Hamilton Lock is now called Victoria Lock; it is at Moelick?—The Victoria and Hamilton Locks are at Moelick, the former being the old, the latter the new work, constructed by the Shannon Commissioners.

666. The Hamilton Lock was in existence at the time of this Act of Parliament?—Yes.

667. And that was the datum from which everything was planned?—Yes.

668. Does the Killaloe Lock still remain now as it was before the original Shannon Commissioners commenced?—I believe so.

669. Unchanged?—Yes.

670. Mr. Wolfe Barry.—Do you think any benefit would be caused by raising the gallery over the sluices so as to take them entirely out of the water at times of flood?—That course has been suggested before. The whole of the Killaloe works become drowned in flood. When the water above the sluices is eighteen inches higher than the top lip of the apron, the water below would be about fourteen inches above it also; so that in reality the weir and sluice valves all become drowned in the extreme flood. It would cost a great deal of money to change the arrangement of the sluices now, and very little would be gained by doing so. I think it would be desirable that the level of the Killaloe weir from being 6·9 feet above the "datum" should be lowered to six feet throughout.

671. Do you mean the weir itself?—Yes; the crest of the weir is not horizontal, and falls towards the sluices; the discharge, of course, would be increased by the amount due to the extra head gained.

672. Mr. Alternately.—The remains of an old weir is above the present one?—That was carried out in old times by the Limerick Navigation Company.

673. I observed the other day when there, that the water was not quite over the sluices; there was a depression immediately above the sluices?—I put down £35,000 for dealing with all that and for endeavouring to get as much discharging capacity as we can all through, and below the bridge.

674. Mr. Pies.—In the original expenditure by the Shannon Commissioners, was not there part of it charged on lands drained?—None of it whatever, was charged on drainage.

675. But gas navigation, was there any of it charged?—In the latter part of my paper I have

drawn attention to that; the total charge which fell gas navigation, amounted to £2,791, on the 34,700 acres.

676. Chairman.—That has all been paid since?—That amounted to a capital charge of the trifling sum of 1s. 7½d. per acre, and was all the owners paid.

677. And there is no further claim on them?—Nothing; the total amount with the accrued interest charged, was £230,860.

678. And that has all been paid?—Yes.

679. Mr. Pies.—If the charge of £230,860 was charged on the original navigation works, what principles were the Commissioners guided by?—It involved considerations of the then existing traffic and modes of conveyance, and the distribution of the charge is shown on the map to be appended. I am having it made out now.

680. Chairman.—Then the figures relating to the scheme will be put on the map?—Yes.

681. Thank you?—I can easily have it reduced for the use of the Commission if they wish to have it appended.

682. I think so. It would be very desirable to append it to your report.

683. Yes?—It shall be done.

684. Mr. Wolfe Barry.—If these works are carried out as now suggested with the outfall of the Suir, and Brauna, and other rivers be improved?—The outfall of the Suir will be so far improved that below its junction with the Shannon their will, of course, be a better section for discharge.

685. The backwater now caused by the Shannon will be reduced?—Yes.

686. Will that be the case with others?—Yes. One point which it is desirable to notice is, that in dealing with this part of the river, between Athlone and the Victoria Lock, the drainage of a million of acres comes into the Shannon; the catchment area above Athlone is only a little over one million of acres; the catchment area above the Victoria Lock is two millions of acres; in that small portion of the river half of the catchment area therefore discharges into the Shannon. Between Victoria Lock and Killaloe the discharge of only 500,000 acres is added to the catchment, so that, if a sufficiently increased section be provided at Killaloe, you will be able to meet all the requirements.

687. The reason I asked the question was that when we were inspecting the Suir drainage we were told that the back water of the Shannon was a great impediment in carrying out their works as well as they wished to do?—Yes, I have no doubt that by the extension proposed at Bishop's Island the discharge at Shannon-bridge will be greatly improved. I have put down £28,000 for that.

688. I suppose we may take it that all the works below Athlone, amounting to £29,000, would be greatly for the benefit of everything along the river between Athlone and Killaloe?—Certainly. My own opinion is that it should go far towards freeing the land during the summer months from any injurious effects of floods like that of 1861.

689. Therefore to that extent I suppose we may assume that the whole drainage area will be benefited by those works quite apart from the benefit to the flooded lands immediately adjoining the Shannon itself?—Yes.

690. Chairman.—That amounts to £29,000?—One of the most important parts of the scheme is arresting and compounding the flood wave in Lough Allen itself. That is one of the most important, because during extreme floods it would free the Shannon to the extent of 200,000 cubic feet per minute.

691. Mr. Wolfe Barry.—And delay that discharge?—Yes.

692. Mr. Pies.—Has there been any estimate formed as to the value of the improvements that would be effected on the lands by these works. As I understand, when the consideration of the expenditure of this £200,000—half by the Government, and

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half chargeable on the lands—was entertained, half the total cost was to be charged on certain lands. Ogd they make any estimate as to what extent the lands would be improved?—The estimate which was made by Messrs. Bransington and Gale, and confirmed by Mr. Lynam, goes to show that the value of the improvements would amount to a little over £6,000 per annum.

693. That would be equal to the expenditure?—

William Lewis,  
 Esq., C.E.

Messrs. Robert Manning, Richard Hassard, William George Stryke, William Lewis, and James Price were called in.

WILLIAM LEWIS, Esq., C.E., examined.

697. Witness.—Mr. Stryke wishes me to explain to the Commission our scheme for dealing with the River Barrow. The object of our getting up this scheme was that the people in the district, after the last Commission, were under the impression that nothing whatever was going to be done, but that the scheme would be hung up, and there was no likelihood of their getting even partial relief from flooding. Some of those persons asked us to look over the district, with the object of suggesting a modified plan. Mr. Stryke and I minutely inspected the whole of the River Barrow, from Athy to Tinnahinch bridge, and we found that temporary obstructions in the river, such as debris, fallen trees, and accumulations of sand about the bridges, caused by floods, in themselves created a very great impediment, and that, if they were removed, a very great deal of good could be done at little expense. That was a mere temporary affair. We then turned our attention to what sort of modified plan we should recommend, founded on an outlay so moderate that it would come within the means of the people to bear. They all declared their anxiety down there to pay some tax, but they said that anything like the tax they would have to pay on the large scheme would not be entertained; so we in accordance with that desire looked into the whole question. We have had the advantage of the Board of Works' plans and reports, and the calculations which were made by Mr. Manning. We divided it into sections, founded on the areas beginning at Athy and going up beyond Bert. We have there a sixty feet section with slopes of one three-quarters to one, and then we lessen the area as we ascend the river. The calculation that we based our scheme upon is that of Mr. Manning himself, as defined, I think, over some 640 square miles. That, Mr. Manning, is what you propose. 400,000 cubic feet per minute represents 400,000 acres. [Mr. Manning.—That is not mine.] I understood your calculation to be that you allow at the rate of 400,000 cubic feet per minute, and on that basis we went. We have reduced the sectional areas, with the view of reducing the expenditure, and what we propose is, that if a narrow cut is made in the first instance, not touching the tributaries, that a vast amount of good would be done, and enable the lands at each side of the river to be drained. We do not think it desirable to touch the tributaries until some arrangement is made for the entire and more perfect drainage down to the sea, a distance of some ninety-seven miles. We think it to be unsafe to send down all the flood waters until an outfall is ready to receive it at St. Mullins, and the obstructions below Athy removed. We therefore confined our operations to the view of giving relief by the main channel, and sinking the tributaries for a short distance, to relieve the waters at the junction with the main channel, and to the removal of the existing fixed weirs in the river, substituting movable weirs with sluices, similar to those put up by Mr. Stoney at Ballinacree. We believe if that were done that the flood waters would be more rapidly discharged through the sluices and under the weirs than over the fixed weirs as at present. I have

Here is Mr. Lynam's estimate, showing the increase of the annual value by drainage from Limerick to Killahee, £295 8s. 8d.; from Killahee to Tarmaherry, £4,639 13s. 8d.; and from Tarmaherry to Lough Allen borders, £1,081 16s. 2d.; the total being £6,016 18s. 6d.

694. Observe.—Will you kindly furnish particulars of it?—It is all adjoined to in my report.

made an estimate of the works, which I have here. The excavations of clay and gravel from Athy to Tinnahinch bridge, and the sinking and securing of the tributaries, we estimate at £24,000; the rock-cutting necessary we estimate at £24,200, and the sinking, unweaving and pumping at £9,512. For underpinning bridges, and making new bridges, £13,100; for the removal of fixed weirs and the substitution of movable weirs, £12,000. These make £117,392; and with contingencies, accommodation works, compensation for land, and law and engineering expenses, we estimate the cost of the entire work to be between £152,000 and £153,000.

698. Mr. Wolfe Barry.—What bottom width do you propose?—A bottom width of sixty feet.

699. Mr. Abernethy.—Can you give us the proposed bottom width at the various sections, beginning above and going down the river?—Yes; the first reach would be to Mountmellick, the bottom width twenty-five feet, and the slope one to one; the next reach would be to Portlanning, the bottom width thirty feet and the slopes one to one; the next to Monasterevan, bottom width forty feet, slopes one to one; the next reach to near Athy, at Dunally, bottom width sixty feet and slopes one to one; and to Athy, which is the last reach, the waterway sixty feet and the slopes two to one. There is a good deal of it through rock. We had no opportunity of taking soundings; but I assume that through this district, at Duncurch and at Bert, there is rock, but to what extent I cannot exactly say—I assume half clay and half rock.

700. How do you arrive at the quantity?—By taking half clay and half rock of full capacity.

701. Did you ascertain by observation or by boring?—By local inquiry. I get sections taken of the river, and some soundings by Mr. Tinsdale. I need say as much as the impression that half and half was safe and reasonable. However, that is conjecture.

702. Mr. Wolfe Barry.—Will you describe how much fall you have per mile, and what the quantity of water in each is?—The first fall would be 2·60 feet per mile.

703. That is at Mountmellick?—That is at Mountmellick. The next fall would be at Portlanning; it would be 2·40, two and a half feet per mile; the next is Monasterevan, where we have it two and a half feet per mile; the next is Dunally, and that would be about eight per mile, and the last reach would be something about eight feet per mile.

704. Mr. Abernethy.—Have you estimated the discharge of water at these various points?—I can give you the whole of our estimated discharge. We propose to have a main channel —

705. Mr. Wolfe Barry.—I see that on the section it is given 1·23 per mile?—We propose to decrease the outlet there. Six inches to the mile might be better, in connexion with the sluices. In the middle channel the average width immediately above Athy is proposed to be sixty feet at the base, the sectional area diminishing as it ascends. The velocity at Athy averages 160 feet per minute; the catchment area

637 square miles, being a discharge in twenty-four hours of 740,000,000 cubic feet; so that providing for such a great rainfall continuing so long as twenty-four hours, if the river were improved the high sectional area would carry off the most exceptional flood water in a few days; but under the ordinary or average rainfalls the section of the river would be more than calculated to carry off all the water of the district.

706. Mr. Abernethy.—You have divided it into certain sections, and have given certain bottom widths for each. Have you estimated the volume of water you have got to each of these sections?—I have. I have gone into it, but I have not brought the calculation with me; they are brought from the upper reaches down to Athy.

707. What I want is the flow of water that you have got to deal with at these various sections?—I quite understand what you mean. This is the whole flow.

708. That is a general view of it?—I have not the calculation with me.

709. You can give it I suppose?—Yes; I have not got it here. If I had been aware I would have brought it to you.

710. Mr. Wolfe Barry.—Does your section include the branch coming in at Monasteran—the river Figue?—The Figue is a tributary. What we propose is to cleanse these tributaries just at the mouth, so as to allow a thorough drainage of the tributaries to be effected when required.

711. What is the area of the flooded land in the Figue river?—I cannot tell you exactly.

712. I think I am right in saying it is 5,738 acres?—We do not touch the tributaries, save as explained.

713. How many acres out of the total quantity do you deal with in your scheme?—We deal with the whole area certainly.

714. You do not deepen the river?—We do not deepen the tributaries at present. We do not propose to deal with the tributaries at present, for this reason, that to bring down the main volume of water suddenly would be difficult to deal with, and dangerous to the districts below Athy. We do not think at present to touch the tributaries until the whole scheme is made perfect to St. Malins.

715. Mr. Abernethy.—You have divided the river into sections, with a given width at bottom and certain slopes. What is the volume of water you propose to deal with in these sections?—To the extent of 180,000 feet.

716. Mr. Wolfe Barry.—You estimated that the floods would run off in eight days?—In five days according to my judgment.

717. But then it has to come down the tributaries which you do not include. How long would it take to come down the tributaries?—Until the tributaries are cleared up the untaken water will remain.

718. Then the only relief you would give would be to the lands adjoining the river which you improve?—Yes, at present, but we give facilities to these persons in the neighbourhood of the tributaries to drain into the main river.

719. Mr. Abernethy.—What other works do you propose besides the formation of these channels?—Well, sir, we propose movable sluices and weirs, and we propose at the upper reach to build a weir or wall above the bridge—Tinnakinnah bridge—to prevent the debris and fallen trees and other impediments from coming down the river.

720. Will you point out on your section where that is?—It will be here at Knockduff.

721. What bridges do you propose to underpin?—We propose to underpin Crossaboe bridge, Bert bridge, Dunally bridge, Monasteran bridge, Ballylong bridge, a foot bridge at Portarlington, a small bridge at Portarlington, Portarlington bridge. We also underpin the Barrow, above the weir, which is to be removed; Kilnasheeh bridge to be underpinned.

722. What new bridges do you propose to construct?—We may require to construct the bridge at

Crossaboe instead of underpinning, and to put our sluices there.

723. I see that for underpinning all those various bridges, and for reconstructing the bridge you mention you estimate the cost at £15,000?—That is the sum.

724. How did you arrive at that estimate?—I have them here, all in detail. On an average I put down underpinning the bridges at £350 each.

725. Without reference to the quantity of underpinning that may be required?—For bridge, I put it down. I found that about £350 would be a fair sum all round. Mr. Stoney has furnished me with an estimate for the gales at the rate of £2 10s. a square foot.

726. Mr. Wolfe Barry.—What is the price of the excavations in the river other than rock?—One shilling and eight pence.

727. And the price for rock?—Four shillings, and in addition I take 792,908 cubic yards at 3d., that I think a fair price for unwatering.

728. That is in addition to the other price?—Yes; that would be 1s. 11d. a yard.

729. And 4s. 3d.—And 5s. for the rock.

730. I thought you said that you added 3d. to all?—Three pence.

731. That is 4s. 3d. for the rock?—Yes. In addition to that I put on ten per cent. for contingencies.

732. Mr. Abernethy.—Have you got estimates in detail of those and of the new bridge to be constructed?—I have got that of weirs to be removed and built, £12,080.

733. Can you give me your estimate for the new bridge?—I have £5,050 for the Crossaboe bridge.

734. £5,000?—£5,050.

735. Mr. Pike.—What works do you propose to remove?—We propose to remove and replace the present navigation fixed weir, with movable sluices.

736. Below Athy?—Yes; and we also propose to do the same with the weir called the Duke's weir, Mr. Hanman's weir, above Athy. The Bert weir should be removed altogether.

737. If you remove those weirs what will you have to pay for them?—We have got an undertaking from Mr. Stoney that instead of injuring the mills he will improve them. We propose to remove the fixed weirs and to put in movable weirs.

738. You substitute movable sluices for the fixed weirs?—Oh, certainly.

739. You propose removing the Bert weir altogether?—I do not see any other way of doing it. It is a very great advantage to get rid of it, because its removal would reduce the excavation very considerably.

740. Is there any other weir which is to be removed altogether?—No more to be removed; but we feel that it would be necessary along the reaches to introduce controlling sluices at some places along the river.

741. Mr. Wolfe Barry.—Can you give us the levels of the floods below Athy?—Well, I think I have got them taken.

742. I mean immediately below Athy?—Do you mean the height?

743. The surface of the water at flood time immediately below the navigation weir?—It is about the level of this as nearly as possible. [Points out a spot on the map.]

744. Could you tell us what it is at the gates in the river?—It would be about a foot over the level. I saw the flood rise a foot over the level above the navigation weir.

745. Mr. Abernethy.—What would it be below the crest of the weir?—I suppose it would be about 4 feet under the crest of the weir.

746. Mr. Wolfe Barry.—Do you know the level of the floods at Ardee?—No, I do not.

747.—What is the area of land that would be improved by your proposal, out of the total flooded area given in Mr. Manning's report?—We have based our calculations altogether upon the whole area of 47,000 acres, but what we consider is that if the tax were spread over the larger catchment area of 400,000 acres

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esq., C.E.

Dec. 6, 1888.  
 William Lewis,  
 Esq., &c.

it would be fairer to everyone interested than to impose a high tax upon a smaller area. 47,000 acres of land, I think, is the total quantity Mr. Fitzgerald reports would be relieved by the drainage. It seems to us that where the higher reaches contribute so much injury to their neighbors below, they ought to pay some of the tax, however small; and we think that the lands next the channel should pay higher in proportion to others on higher elevations. If levels were taken and marked in zones on map the valuator could see and accurately ascertain the effects produced at different elevations, and value the lands accordingly.

748. What I wanted to ascertain from you was, what is the area of the low-lying land that would be relieved by your proposal?—The area would be over 47,000 acres, I think.

749. You mean more or less relieved?—Yes.

750. Not totally relieved?—Yes.

751. Some of that 47,000 acres would be only partially relieved?—Yes.

752. Can you tell us how much of that 47,000 consists of low-lying land?—I could not.

William  
 George Stryke,  
 Esq., &c.

William George Stryke, esq., &c. examined.

760. Witness.—With regard to the tributaries I can add some information to what Mr. Lewis has said as to what the outtings necessary to be made to meet the main channel will be. The outtings in the main channel will lower the rivers, and the tributary above Bert will drain a very large area of bog, which I believe would be a decided relief by lowering the water in the main channel. We have over £9,000 for dealing with the expenses of the tributaries in important places. The relief afforded by taking that water off the low lying districts, we consider will be an enormous improvement to the bogland. At Monaster-evan it is blocked by the banks in the main river, and by cutting away the block in the main channel, which we believe stops the water in this river, we get it away. The Tringua river is in the same way, and by lowering the main river itself we remove the block. We believe that by this means we considerably relieve the tributaries and the districts lying round them. We have gone over the districts, and consulted the various occupiers of land adjoining the tributaries, and we have ascertained that what they think is that this will give them great relief from the flooding they suffer from at present. That too will take away the shallows which are being formed by there being no sufficient outlet from the tributaries. The river has become blocked up from the fact of there being no authority to look after it and keep it open. The restoration of the river to what it was in the memory of those living in the districts would be of enormous advantage to all those places. One man told us that formerly he had been getting for his land 6s an acre, which having become flooded since he can only get ten shillings an acre for it now. Of course there has been a fall in the value of land, but there has been nothing like that reduction which is due to flooding by accumulation of water. The whole outlay involved in this work is an outlay that the district could reasonably bear. Everybody considers that the large outlay required to carry out a perfect scheme would be so great that it would result in hanging up the scheme; but a project carried out piecemeal would largely benefit those with the least possible outlay. There is another point that I think worth mentioning. If a large work were to be carried out throughout, one of the first things to be done would be to make an opening out. You might make in this way an instalment of the whole project, and would then be able to see to what extent the lands had been relieved. Mr. Lewis and myself think if that were carried out in the manner we propose it would be ample. There is an apprehension—although, of course, it has been pointed out to the former Commission—an apprehension which is enter-

753. Should I be wrong in taking it at considerably less than half. I think I am right in saying that the quantity of low-lying land in the main river is about 50,000 acres, and that the total quantity is about 45,000 acres?—That would be about it, sir.

754. Mr. Attorney.—What does the yellow color indicate on the section?—Embankment.

755. Mr. Wolfe Barry.—I think we gather that your proposal is to run the floods off in five days?—In five days of exceptional floods.

756. And that if a flood occurred after your works were done, there is every probability of the land remaining flooded for at least five days?—We say that five days would carry off the water of the entire water shed.

757. Mr. Pies.—How often do you say there is a probability of there being such floods?—Once a year, some years ago we had no floods at all there.

758. Chairman.—Have you any further statement to make?—No, sir.

759. Mr. Pies.—You do not propose to do any thing below Athy touching the navigation?—We do not.

tained below Athy that the pressure back would be so great that floods might arise below, and the farmers state that their lands in the lower reaches below Athy are more valuable than those above Athy, and that it would be a mistaken policy to run the risk of damaging the lands lower down in order to relieve lands of comparatively inferior quality. By the modified scheme we propose we consider we accomplish the maximum amount of benefit at the least practicable outlay.

761. Mr. Attorney.—What does that section represent?—This is an outline sketch to show a comparison between the work proposed by Mr. Manning and what we propose. We show our spill bank where required for the purpose of security to the adjoining lands. It is shown in yellow on the longitudinal section. We consider it a very large economy to avoid touching mills as the interest is very heavy, as in one held by Mr. Hannan and one also by Mr. Hangan; if the weirs were taken away they would expect compensation. We consider, as we propose present summer levels, that we maintain the water power and, in fact, improve it.

762. Mr. Pies.—Is that mill stopped by floods?—Both mills are stopped by floods. A very moderate amount of flooding brings up the tail-race water. By the plan of a movable sluice that would be overcome.

763. Mr. Wolfe Barry.—Have any valuations given you advice as to the amount that should be charged on the land immediately adjoining the river, for the relief that this scheme would give?—One gentleman has been consulted, and it was with his co-operation that Mr. Lewis thought it well to suggest the system of obtaining the loan proposed in his evidence. He thought, that near the river itself, if the land was charged from three to four shillings it would be a fair thing.

764. Per acre?—Per acre; and diminishing it as you depart from the immediate benefits and from the river itself.

765. Is that per acre per annum?—Per acre per annum.

766. Chairman.—To provide for interest and for the ultimate extinction of the loan?—Well, what I understood from Mr. Barry was the local opinion as to what they could afford to give.

767. My question was as to valuation and not local opinion?—It was a valuator that we consulted, and he considered that from three to four shillings adjoining the river would be a fair tax for the farmers to bear.

768. Would that tax be sufficient to provide for the extinction of the loan and the interest said to

should be paid up!—It would, sir, by the terms on which the Government give money at present.

769. How many years do you propose to spread the cost over so as to extinguish the entire loan?—It would be fifty years, sir. One gentleman we spoke to, Mr. Harvey, considered four to five shillings would be a fair amount along the river.

770. Fifty years you propose?—Yes, sir.

771. Are you aware that those loans are generally for a much shorter period?—I thought they were for thirty-five.

*Richard Howard, Esq., C.E., examined.*

774. *Chairman.*—Mr. Howard, I believe you wish to make a statement to the Commission in reference to your suggested plan for remedying the flooding of the River Barrow?—Yes, sir. I have considered the question, and perhaps I may preface my evidence by saying that, in addition to having a good deal of experience in relation to rivers, I have carried out two arterial drainage schemes in the Barrow district; so that I am well acquainted with the geological condition, the materials, and the means by which this work can be carried out. I believe that nothing short of a large general scheme will meet the requirements of the locality, and that the cost of the necessary works is so far in excess of what the lands can bear that the scheme could not be carried out without a considerable gift of money from the public purse. It is on this principle that I have made out my estimate of the works I consider necessary.

775. Have you copies of that estimate?—I have got a copy that I will hand in. I believe that the project would require an outlay of £250,000 to carry out a perfect general scheme of main drainage, and that the cost of freeing the land on the tributaries, although not nearly so great as that of freeing the land adjoining the main river, is still so great that it could never be carried out afterwards by private enterprise. That view was entertained also by Sir John McNeill, and we put in a dissent from Lord Spencer's Commission, of which I was a member with Sir John McNeill. For instance, the Figgie river, which is a tributary, which would have 5,738 acres relieved from food at a cost of £24,000, or £11 4s. 9d. per acre.—Mr. Fitzgerald's estimate of improved value being only 5s. 10d. per acre—this of course would be productive.

776. Are you referring to your own report?—Yes.

777. At what page?—Page 11. My estimate is higher than Mr. Manning's estimate. I consider that if the project is carried out at all it must be carried out as a general, comprehensive scheme. The manner in which I arrived at my estimate was in this way.—I made an independent estimate of the cost of the works of the Great Barrow from Athy to the junction of the Little Barrow and the Figgie river, above Monasteraven.

778. Have you any plans?—Yes, I will produce them. Here is the first map—Sheet of the main Barrow from Athy up to Monasteraven, where the main Barrow ends and the Little Barrow commences.

779. Mr. Wolfe Barry.—Does that materially differ from the Board of Works' section?—It differs from it in this respect, that we provide for a maximum discharge of 320,000 cubic feet per minute at Athy—whereas they provide for 400,000. Judging from the results of the flood discharge in the Brooma district, I believe that 30 cubic feet per acre per minute is sufficient to carry off all except those extraordinary floods that occur perhaps once or twice in fifty years, and that cannot well be provided against.

780. That is equal to 320,000 cubic feet per minute?—It is; it is equal to 320,000 cubic feet per minute. You will find there the results of the floods in the Brooma for the last 30 years. The Brooma district

772. Why do you extend it to fifty years?—Because this district is a very poor one and they look forward to every assistance for this work by the Government. A fifty years loan comes earlier than thirty-five.

773. Mr. Wolfe Barry.—I do not know whether you are aware that Mr. Fitzgerald estimated that the improved valuation for the entire drainage in the Great Barrow was 4s. 5d. per acre, and on the Little Barrow 4s. 1d. per acre?—That was the average. He is at the immediate vicinity of the river, but others are much further away.

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—  
William George Barry,  
Esq., C.E.

Richard  
Howard, Esq.,  
C.E.

is comparatively small. In geological formation and position it is precisely similar, but has a drainage area of about 285,000 acres, as against 400,000 acres of the Barrow; and in that small district for the period of thirty years, floods exceeding 30 cubic feet per minute occurred three times only, and on two out of the three occasions the excess was very slight. So that I consider it a very safe guide to adopt when estimating for a maximum discharge of 320,000 cubic feet per minute at Athy. There is no doubt that in the flood of September, 1879—which was a most extraordinary flood if the marks and levels that were pointed out to me at Athy were correct—there must have passed down the river there 400,000 cubic feet per minute; but that was due to a rainfall of 2.95 inches, a rainfall of 1.85 having been registered at Carlow on the same day; but that was one of those exceptional storms that occur at widely distant intervals of time, and can scarcely be provided against.

781. Mr. Pim.—Did it follow after fine weather, or had there been rain previously?—I do not recollect now, but it was a storm of extraordinary rainfall all over Ireland. The way, sir, that I arrived at my estimate was this—I took an independent estimate entirely of the quantities of excavation from Athy to Monasteraven for the Great Barrow, and from Monasteraven to Rathoeilly-bridge for the Little Barrow. My quantities, making allowance for the smaller area of discharge in the Great Barrow, agreed in both cases, very nearly indeed, with Mr. Manning's, and therefore in the tributaries I assumed his quantities to be correct, but I considered his prices too low, and I put the same prices at which the Rathangan river drainage district had been carried out by myself in the same locality, so that I have no doubt as to the sufficiency of my prices.

782. Mr. Wolfe Barry.—Will you give us your prices?—At Athy it is 1s. 5d. for excavation; above Athy from Dromally to the Pinery it is 1s. 2d.; above that, 1s. 1d., and for the Little Barrow it is 9d.

783. And what is the rock?—The rock is 3s. The way the Rathangan river district and Lart river district works were carried out was, in all cases we made a new cut, as nearly as possible making a give-and-take line, and in that way we were able by excavating a portion of new channel to get the water into it when the weather was dry, and then we were able to run all the remaining stuff into the old channels and fill them. I consider that it is cheaper, where it can be done, to make new cuttings in that way than to deal with the existing channel of the river.

784. Then your prices include everything?—They include everything. They are the same prices as those of the Rathangan river work.

785. Mr. Attercliffe.—You do away with the necessity for dikes and so on by forming a new channel?—Yes; for instance, in going through Lord Drogheda's demesne, that is a case in which you could not put spoil upon the banks, and in that case we proposed a relief cut which was laid out with the sanction of his lordship's agent.

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Richard  
Stewart, Esq.,  
C.E.

776. Mr. Pim.—Does this plan lead you into liability to compensate the owners?—You may have to buy land where necessary for works and for the spoil. The slopes of the channel are all taken out at 2 to 1. We find by experience that through arch drainage districts a steeper slope will not stand. As regards the weirs at Athy, I have changed my views slightly as to what would be the best mode of dealing with the obstruction there. In my report when on Lord Spencer's Commission, I recommended that that weir (marked on the map) should be lowered three feet, and this head navigation weir done away with, and a double lock made to connect the Grand Canal with the Barrow navigation. Now I believe that it is better to do away with the upper weir, and to retain the other one, and to lengthen it to 630 feet; it is now 530 and would require 100 feet more; and excavating the weir basin above it so as to give the whole weir free play with water. This Truck bridge [pointed out on the map] would require to be taken down and a new bridge built—it is a terrible obstruction. This [on the map] represents the new channel. This mill would have to be compensated, as the water-power of the mill would be done away with; but the Arklow mill which I proposed to be done away with before would remain. At Athy mill there is a fall of only three feet; in summer there appears to be no care taken to preserve the water. For instance, in 1854, when I was there there was an escape of 1,500 cubic feet per minute passing through the loose stone causeway for guiding the water to the mill and giving access to the sluices. [Witness produces another map.] Here is the height of the flood of September, 1873, passing about three feet deep over the Athy weir. This shows the flood level below Athy bridge, and this shows the future flood level which would be about two feet over the crest of the navigation weir.

777. Mr. Abernethy.—The future flood level at that weir?—Yes; the weir would be 630 feet long.

778. Mr. Wolfe Barry.—Could you give us the future flood level above the Ordnance datum?—Yes; 179·25, that is two feet over the crest of the weir. The crest of the weir is now 177·25. I will hand this in for the use of the Commission. Here is a cross section, showing how the works would be excavated through Athy, and each portion deepened first, or sunk. At the Long Race Drainage Works I recommended it to be done in that way, so that a good deal of excavation may be done by manual labour, instead of doing it all by dredging. At Athy weir the flood level would be lowered about 4½ feet—4·06.

779. At the Duke's weir?—At the Duke's weir. This contemplates the removal of the Duke's weir.

780. Mr. Abernethy.—You propose that the weir below that should remain?—Yes.

781. And you have abandoned your project of two locks at the canal?—Yes. This is a section from Athy up to Monasterivan—a section of the Great Barrow. The flood levels are shown in the same way. The scale is 10 feet vertical, 6 inches horizontal.

782. Are you going up the river?—That is going up to Monasterivan.

783. By doing away with the weir, you do away with the present mill?—Yes, and that would necessitate compensation.

784. Mr. Pim.—And the Bert mill would have to be compensated also?—Yes, it is a small mill. I do not know whether it is working now. When I saw it last there were no boats on the wharf.

785. Mr. Wolfe Barry.—It was working when we saw it—Perhaps they were taken off for repair. Here (producing another plan) is from the junction above Monasterivan, through Portlinton up to Rathoffey bridge. These two main portions are what I made independent estimates for, for the purpose of stocking Mr. Manning. The upper portion of this is of a sandy and gravelly nature. We propose to deal with that, as we did at the Lee river, much of which was through sand and gravel, we made the channel there wide and

shallow, and protected the sides with dry walls or stones roughly piled against them, so as to prevent the river undercutting its banks, and changing its course.

786. Beyond the channel?—To where the flood level comes up. The water when it was prevented from undercutting the banks, very soon swept away all the finer material that was in the bottom of the river, and it then became paved with loose boulders, and they prevented it cutting out the bottom and sides, which were protected by a dry stone wall. In the same way we put a stop very nearly to all the silt or mud coming down. We left the channel as wide as we could, so that the flood water has a shallow depth, and in that way we at once put a stop to it, although it was very bad, indeed, at first. In relation to the mode in which I propose that this work should be paid for, I sent in a communication some time since.

787. Chairman.—It is in print (copy handed to witness). Mr. Fitzgerald's valuation of annual improvement was something about £10,000, but he admitted himself that it was taken rather low, that it was a good deal too low. I propose that the expense there should be partly met by a small general tax over the whole area—an improvement tax.

788. Over the whole 400,000 acres?—Over the whole 400,000 acres, and by a special improvement rate on the lands that are directly benefited in the same way.

789. Will you mention the figures that you propose?—Mr. Fitzgerald estimated the improved value of the land as £10,000, and he has admitted that that was a good deal too low; however, I take that £10,000, and I have adhered to it; that £10,000 when capitalised, reaches £300,000. I propose that a rate of 6d. in the pound should be levied on all property contributing water to the outfall as a general improvement rate.

800. Sixpence in the pound?—6d. in the pound; that would amount to an average of about 5d. per acre, and would produce the amount of £5,380 annually, and that capitalised would represent £107,600.

801. Capitalised at what rate?—At 5 per cent.

802. Five per cent., to include interest?—I have also made out a second statement, which I sent in to the Secretary in which I have mentioned that. It was in the form of a letter. I represented that the amount of the two rates together would pay interest on about £300,000. I mean the expenditure to be charged on the locality would amount to about £300,000, and that if the Government advanced that £300,000, it could be paid off by the two rates. I know that the two rates together come to about £15,400 per annum.

803. Mr. Barry.—That is very nearly what you have given as here?—There was a letter also sent in.

804. Chairman.—What was the date?—It was about three weeks ago.

805. Mr. Pim.—Was it September 23rd?—No, it was subsequent to that. The two rates together would amount to £15,400 per annum; then deducting from that, say, £3,400 per annum, to cover the cost of collection of rates, and the expenses of maintenance and management, would leave £12,000 to be levied off the locality. A sum of £100, advanced as a Government loan, at 3½ per cent., the principal and interest to be paid off in fifty years, would require an annual payment of £4 5s. 3½d., which I call 4½ per cent. At this rate £12,000 would produce just £300,000. The balance of the outlay necessary for the completion of the undertaking, £250,000, must be a gift of public money. I do not know, sir, that I have anything else to remark. It would require a special Act of Parliament, because there is no drainage Act in force that would allow money to remain fifty years without being paid off. I think also, that in any scheme of this kind, there should be some charge as regards the taxation, which should fall on the occupier, I think, and not on the owner of the property, the occupier deriving the direct benefit.



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Richard  
Blissard, etc.,  
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806. Mr. Abernethy.—Have you your detailed estimate of the works?—Yes. [Handed in.]

807. I see you have divided the river into sections?—Yes.

808. And you have given the quantity of excavation required at these sections?—Yes.

809. But you have not given us the bottom width?—They are all shown on the cross-sections attached to the longitudinal sections, and the area of flood and discharge are also given.

810. You have given the discharge in each case?—In each case.

811. Have you a section of the water ways of all the various bridges?—The only one that I have is Athy, taken there.

812. There are a good many above that?—There are, but the first one above—Downally—that is four arches, of thirty feet each. I recollect that; it is a good strong foundation, and a good strong bottom. I do not think there would be any difficulty in dealing with any of the bridges.

813. You think there is sufficient water way in floods?—Yes, if they were undisturbed.

814. Do you propose to embank any section of the river?—No, sir; it would not be practicable. Where there is a weir or outcrop, or sudden fall, it could be done, but here you would have to pump the lowlands adjoining until the flood fell.

815. But in the upper part, where the fall is greater, an embankment could be resorted to?—I do not think there would be very much good in that, sir, in this small channel. I do not think it is worth taking into consideration.

816. I see that you have given estimates for the tributaries also?—I took the tributaries by taking Mr. Manning's estimates of quantities, but my own prices. Mr. Manning was good enough to give me his estimates in detail, when Lord Spencer's Commission was sitting.

817. You have adopted his dimensions, but put your own prices?—Yes, but for the Little Barrow, extending over forty miles, I took my own quantities and prices. Mr. Manning's prices were lower than I consider they could be done for now.

818. You do not interfere with any of the weirs above the Athy weir or the Duke's weir?—The next weir—the Bert weir—we propose to take that away.

819. That is where the mill is—the Bert weir?—Yes.

820. Mr. Wolfe Barry.—Do you include in your estimate any work below Athy?—No.

821. Nothing connected with the lower river?—No, terminating at Athy.

822. You are aware that some evidence was given about the fear of flood below Athy?—Yes. I was a member of the Commission.

823. May I ask you whether your opinion is that if this scheme of drainage is carried out above Athy there will be flooding of the land below Athy?—I believe the maximum flood would not be increased, but that ordinary floods would be increased by probably 20 per cent.

824. Do you mean in height or quantity?—In volume. It is manifest that if the water which formerly ran off in five days now runs off in four, the quantity must be increased; the same quantity comes in less time and the flow will be increased in a shorter period; the flood would begin earlier, because the water which now flows over the ground would run away down the enlarged channel.

825. What would be your view as to the liability of any scheme for the upper Barrow in respect of any flooding in the lower Barrow?—No doubt, I think that some works would be necessary in the lower Barrow, but to what extent I could scarcely say at present. I examined the river, and spent a couple of days upon it; but without close examination and measurements, one could not tell the amount of work necessary. The river is terribly blocked now by angles.

826. But be it more or less, that would have to be added to the ultimate cost?—Yes, for any scheme of importance I think that it would be necessary.

827. Do you think that the heavy floods would be increased by about twenty per cent?—By about twenty per cent.

828. Mr. Abernethy.—You do not say in height?—No, in volume.

829. Mr. Wolfe Barry.—Of course the height would vary in different places?—Mr. Price, who appeared for the proprietors of the lower Barrow at the inquiry, agreed with me that the maximum increase by ordinary floods would be twenty per cent.

830. Mr. Abernethy.—The high lands are pretty close to the river at the lower Barrow?—There is very little flood coming into the lower Barrow. It is a curious river. It is contrary to most rivers that I have seen. The fall gets greater as you get seaward.

831. Mr. Wolfe Barry.—That is not unusual in Ireland, I think, as you see in the Shannon?—Yes.

832. Mr. Price.—Would the twenty per cent. increase in the volume of water affect the mills below?—I think not.

833. Would it last so long as to affect them?—It is difficult to say, some of the mills are so easily affected. At Millfield the miller there told me that he was once thirteen weeks continuously stopped by backwater.

834. Mr. Wolfe Barry.—Could you tell us the average level of the river below Ardfine lock above Ordinance datum?—I could not.

835. Are there any cross sections of the river showing the land adjoining?—For the lower Barrow?

836. No, the upper Barrow, extended on to the land?—There are levels on the Ordnance map that would guide you.

837. But no cross sections?—No; but there are levels on some of the Ordnance sheets, there are levels that will show you that for some distance back, for instance, the connexions of Finery river.

838. Assuming, for the sake of argument, that some increase of floods would take place below Athy, would you say that the cost of dealing with these floods should fall upon the district of the lower Barrow, or on the district undertaking the new drainage?—Well, I think that probably it should fall on the district undertaking the new drainage; but in the management of the river in future I think it should certainly fall on the parties interested in the lower Barrow.

839. Did you consider at all, whether the trustees of the navigation had neglected their duty in clearing out that river?—They did not seem to think that they had any duties at all to perform, as far as I could see; so long as there was a passage left, sufficient in width and depth for the passage of barges, the proprietors of the navigation did not seem to pay any attention to the matter.

840. My question was, rather what you thought?—My own opinion is that they have neglected it very greatly indeed. The practice of planting osiers on the islands, formed a very serious obstruction indeed. In some of the old maps, and some of the early Ordnance maps, there are only just the indication of shoals, where there are now large islands.

841. Is it your opinion that the floods have risen in height in the lower Barrow, of late years?—I could not tell you as to the lower Barrow, but I should not think there has been much change there; but, no doubt, in the upper Barrow, I believe the bed of the river has gradually risen from the silting up of the channel, where detritus is brought down in these floods.

842. Do you think anybody has formed an estimate of what would be the increase in the lower Barrow?—I am not aware. There would not be as much increase for any great length in the lower Barrow, because when you get below Bagenalstown, the river is very narrow and precipitous on either side, and the whole quantity of water there, would of course, be increased by much less per cent. than up here.

Doc. A. 1861.  
 Richard  
 Russell, esq.,  
 &c.

843. No doubt. Have you any instances in your experience, of a general rate being put upon the whole of a drainage area?—Not for draining purposes.

844. Contributing to the outflow of water?—Not for drainage purposes, but it is done for works of water supply. It is a very common thing to levy a general improvement rate, on all the property of the district, as a direct rate, whether the parties having the power to use the water use it or not.

845. Is it also the practice to levy a sort of general rate for navigation purposes?—I am not aware of it.

846. Mr. Abernethy.—Any towns benefited, you think ought to be taxed?—I think so. The parties that gave evidence before us, said that they would be quite willing to bear a small tax for the benefit that they would derive.

847. Mr. Wolfe Barry.—Is it your opinion that they would pay for a system of drainage, which was confessedly, to a certain extent, imperfect?—I do not think they would pay for it, sir—the occupiers—even if it was quite perfect, if they could help it. That is my own impression. I, unfortunately for myself, joined some other landowners, in the County Galway, at the urgent request of the tenants, to relieve the district of flooded land; the tenants gave evidence and said they would do anything to relieve this land, which was most valuable meadow land; but when the works were carried out, they came forward and said it did the greatest possible injury, and the result is that I have had to pay £40 per annum, or almost all of it myself.

848. Would it be your opinion then, that there should be a compulsory rate?—Certainly.

849. Without requiring 50 per cent. of the assents or what proportion of assents would you say?—I think it is two-thirds that is required now for arterial drainage. (Mr. Serjeant.—A majority.)

850. Would it be your opinion that this contribution of £15,400, in gross rates, should be levied as a compulsory rate?—Yes, certainly, as a compulsory rate on the whole district.

851. Do you anticipate that there would be any difficulty in getting assents from a moiety of the contributions?—There would be, no doubt: certainly to a general rate, because the parties living furthest away, who generally send down most water, and do most mischief, would say they derive no benefit from the drainage, and they certainly, I think, would dissent.

852. Do you think other parties—the occupiers of the lands more immediately improved—would also dissent?—Those that we spoke of all said not. Some of them said that they thought the lands were rated rather too high, but that is a matter which could be adjusted afterwards; but they almost all said that they would be very glad to see the work carried out. But then, as I told you in my own case, they might change their minds afterwards.

853. Chairman.—Holding these views would you recommend a compulsory rate?—I think the rate should be compulsory, contingent on a Government advance. If the Government advance £250,000 as a first gift I think the remainder of the cost should be met by a compulsory rate.

854. Have you calculated what would be the increased value of the land—the free-silt?—Mr. Fitzgerald calculated that; it is nearly £10,000 a year.

855. In the land flooded?—Flooded and submerged and injured. There are about 25,000 acres submerged and 25,000 injured by the floods.

856. Do you attach any importance to the sanitary aspect of the question?—There is no doubt that when the land is all flooded, as it is in the winter, and that you get a hot summer afterwards, as in 1834, health is liable to be endangered. I was over the land at Monastercavan in 1834, when there was not a drop of water lying on the land; but it had all been sodden by previous floods. The weather was very hot, and certainly there was a very unpleasant vapour, and a disagreeable sensation produced over the whole place. The

meddled evidence of the doctors who appeared before the Commission all attached great importance to the water being got rid of, and they said that there was a great amount of ague and febrile diseases caused by it, which, if it were removed, would not prevail.

857. Would a guarantee of the compulsory rate over the whole area be required?—Yes. I think if the Government contributed that £250,000 they should make it a condition that the rate be compulsory.

858. Levied, I suppose, on the valuation?—Based on the valuation.

859. Mr. Wolfe Barry.—How would such a rate be collected?—In the same way as the Grand Jury cess and other rates.

860. By the county?—By parties appointed. I took an item off to meet the expense of collection—£500 or £700—and the remainder of £2,400 would be involved in the maintenance of the river and the general management.

861. What I meant was—what would be the machinery for collecting the rate? Would it be collected by committees and handed over to the Drainage Board or to the Government, or would any specially constituted board have to collect the rate?—There would be a Drainage Board, no doubt, if the scheme were carried out by a Drainage Board under the control of the Board of Works.

862. Chairman.—And the money paid to the Board of Works or into the Exchequer?—At present each money is paid to the Board of Works.

863. Mr. Wolfe Barry.—Is it collected by the county among the county rates?—It is now levied not off the county. For instance, I get a letter every half year from the Board of Works stating that my proportion of the drainage rate I spoke of comes to so much, and I send a cheque. It would have to be levied in the same way as the poor rate or the county cess.

864. From the evidence given at your Commission did you attach much importance to the question of the navigation up to Athy?—Yes, I did; but I do not think that these proposed works would injure the navigation at all. I mean that the ordinary floods being increased in flow would not injure the navigation, because in times of heavy flood now the water stops a longer time, and the floods would last only a short time after the completion of these works. When there is a strong current in the river the navigation is stopped, as there is no steam power used.

865. Mr. Pies.—You mean that the navigation is sometimes stopped below Athy?—Oh, yes. There was a table headed in at my suggestion—from the year 1871 I think it was—giving the number of days during which the navigation was stopped by flood or by ice during each year.

866. Chairman.—I presume you would suggest that the rates should be collected in the same way as other Government loans?—To tell you the truth, sir, that is a matter of detail that I did not pay very much attention to; but I presume that the works would be carried out by a Drainage Board, and that the Drainage Board would collect those rates and hand them over to the Government or Board of Works, as the case might be.

867. I think it right to say that the Chairman of the Navigation is very apprehensive of great damage being done to the navigation?—Yes, sir; he gave evidence to the effect that he thought all would be brought down, and choke up their locks.

868. In the extracts from various reports and evidence I find that statements have been made from time to time to show that the navigation would be greatly damaged if these works were carried out?—I do not think they would, sir. So far as silt is concerned, there would be less silt brought down the river in future than there is now. There would be a regimen established in the channel and that would cease.

869. Mr. Abernethy.—Do you know the river Blackwater?—I know it in this way, that I made a railway down in that country a great many years ago.

I was constantly in the valley, and I know it in that respect generally, but I have not any special knowledge of it.

870. You are aware that it is an unbanked river?—I am not aware of the fact.

871. Mr. Pies.—You say that the river below Athy has become very much blocked up by the neglect of the Barrow Navigation Company to clear out the bed of the river?—Yes.

James Price, *esq.*, *c.r.*, examined.

872. Chairman.—I believe you have a communication to make to the Commission in reference to the Barrow?—Yes, sir. I was very much engaged with others upon the lower Barrow, and I examined the lower Barrow very carefully and I formed an opinion that without some modifications of the system of drainage proposed the interests along the lower Barrow would be very much affected. I examined the river and took sections of the river in various places. I gave my evidence very fully in the inquiry that has been held, and it is given by the Commission in their printed report very much in extenso. I do not see how it would be possible to carry out these plans without very extensive works at the same time being carried out in the lower Barrow, quite over and above what is called the clearing. A great deal was said about the clearing of the river but I found on examination of the Lower Barrow that a great deal bearing on the question and that had been alluded to by me was never taken into account.

874. You speak of the lower Barrow?—Yes; because the plan you would propose for the higher Barrow would depend at the same time on a knowledge of the lower Barrow.

875. Would you give the details as to the grounds of your opinion why the lower Barrow would be so much injured?—As things are at present in the district—

876. What do you mean by that; above Athy?—Yes, above Athy; the whole district undraind. The great floods from the upper district do not arrive at the lower district immediately, except it happened to be the case (which is very rare) that at the time when one flood had filled the whole of the flooded lands of the upper Barrow another flood should come down, no doubt then the water would pour down as fast as it would if the upper Barrow were drained, as it is proposed to be. But in ordinary cases of flood—I mean ordinary maximum yearly floods, I believe that the water will be increased and that rainfall will come down in a body into the lower Barrow, for this reason, the tributaries of the lower Barrow being short and rapid, the water from them passes away before the floods from the upper Barrow can inundate; but if there were deep cuttings made there is no doubt the discharges would come simultaneously; I believe there would be an increase of twenty per cent. of water to be discharged in the lower Barrow habitually during flood times.

877. Assuming that it is desirable to drain the upper Barrow, what measures would you deem necessary to protect the interests of the navigation, and of the owners on the lower Barrow?—Assuming that it is to be done in this particular way, the channel would have to be very much increased in size in the lower Barrow, and certain mills would—several of them—require to have a good deal of works done in order to enable them to work as at present, or they must be done away with altogether; and the weirs should be very much heightened in places.

878. Have you a scheme of your own?—I have. I have not gone into the actual close details of it, but the general principle of my scheme is, first I would change the gradient where it is too steep so as to prevent the cutting away of the banks, and the carrying of silt down to the lower river. I therefore propose to lower the whole river in steps, or rather slides where a rapid fall can be made, and those slides I would have completely protected, either pitched or

872. Do you think these obstructions if removed would enable the river to carry off the extra quantity of water that you propose to send down?—That would, no doubt, be so at some of those points where the obstructions exist, but there are other points where a different state of things exist. I have here the schedule of prices at which the Rathangan river drainage was carried out, and which I submit for the use of the Commission.

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c.r.

concreted. I would concretize the velocity at particular places, and protect the banks there.

879. Do you in that scheme propose to adopt it for both the upper and the lower Barrow?—No. I propose to do nothing to the lower Barrow, because in addition to that I propose to form reservoirs on portions of the flooded lands, by embanking around them, which would hold about the additional quantity of water that I would expect, in consequence of the drainage, to flow down the lower Barrow. I consider that if about 2,000 acres of the flooded lands were embanked in convenient places, about one-fourth the flood discharge, or 80,000 cubic feet per minute for four days could be impounded in those reservoirs, four days being about the length of the flood; this impounded water, to be allowed to run off quickly after the flood had subsided so as to mitigate the drainage which arises in the lower Barrow.

880. Is that all the work you propose?—I propose also to embank at many places where the land could be much better protected from floods by embankments alongside the river, and to drain the adjoining land by back drains; there would be very heavy savings in that way, and to carry out my system of moderating the gradients it would be necessary to form embankments of that character alongside the river.

881. Mr. Abernethy.—Taking this to be the ordinary channel of the river at the ordinary levels you form embankments?—Yes.

882. And you have a back drain at a lower level, with sufficient fall to carry the drainage to the main river?—Yes. I have sketched this outline on the original plans in several places, which I can lay before you.

883. Chairman.—If you please?—I propose to make these changes in the gradients and to pave or concretize the slides; then I propose to embank wherever it is necessary. So far as I can see these would be the points that would be most necessary without more detailed examination. I will show you in different sections what I propose to do. There is a very large fall here. This is one of the places where I would form a reservoir, a little above Menasterman, where there is a very rapid fall and the ground slopes.

884. Mr. Abernethy.—Your object being to form a reservoir to receive the water during the floods?—To receive a fourth part of it for four days. That would reduce the rate to about half.

885. Would you furnish the sections showing the amount?—I shall do so. This is the other plan—the same thing is done here. I consider, with such rapid falls, the silt brought down would be something very great.

886. At the lower Barrow do you find the hard original bed has been undisturbed?—Yes.

887. There are a number of shoals that are not original beds?—Yes, but they are trifling; if the taking away of them was carried out it would not be a serious thing, but the river itself is quite insufficient to pass the flood without large works being done. I estimate that nothing less than £100,000 or £120,000 should be spent on the lower Barrow.

888. The quantity of land submerged during flood is comparatively small?—Yes, but there are, at the towns of Carlow and Leighlinbridge, and at the mills floods which are very serious.

889. You say that the land inundated on the lower Barrow might by embankments be protected to a

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*esq.*, c.r.

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James Price,  
croy. O.R.

certain extent?—It could. I do not place so much stress on the land as on the navigation and the country-bridges, many of which would have to be removed.

890. The water-way being insufficient?—Quite insufficient.

891. Then the fact is that the floods would do no very great injury, so far as flooding the lands, but would affect the navigation of the river, and would necessitate the alteration of the water-way at the bridges and the mills?—It would.

892. Are underho wheels I presume at present?—Yes, breast wheels, I think. There are some underho.

Mr. Rossard.—They can lift their wheels so as to regulate them according to the height of the water.

893. Chairman.—You stated that you did not think there were any obstructions in the lower Barrow that had been caused by the negligence of the Commissioners?—I do not think there are. I not only sounded the whole of it but I tried it by a pole. There are no obstructions there except some weeds and such matters, which are quite insignificant; there are mere accumulations of silt beds and stuff.

894. Why should they accumulate?—It can hardly be called negligence. I spoke to the navigation people about it and they said it would be detrimental to the navigation in autumn, when they require to have the water narrowed; they said that taking these away would be injurious to the navigation.

895. But by allowing the obstructions they set injuriously to the interests of landholders along the Barrow?—I think so.

896. Mr. Price.—If you increase the sectional area in the silt beds would not the navigation suffer still more?—It would. What I proposed to do in it was to deepen the upper ends of the reaches of the river, so as to give them more water; to deepen it backwards, not the lower ends, but the upper ends. I never contemplated works in the Lower Barrow, for they seemed to me so very great that what would have to be paid both for compensation and works would, I suppose, come to as much as would buy out all the local interests.

897. Mr. Wolfe Barry.—Do you know how much water comes down to Athy in time of flood?—I agree with Mr. Manning that it would be about 600,000.

898. And at ordinary times?—I should say about 300,000. I should say that ordinary flood would not be more than 300,000.

899. And at the present moment how much would it be?—I should say not more than 200,000. I never made a measurement, but I would say the river, after comparatively dry weather, appears to be half filled.

900. When you have got heavy rain, and your flooded area of 45,000 acres is flooded, and the water coming off, the remaining 355,000 acres continue to be discharged into the flooded area, does not that quantity have to go off at Athy?—Yes, it has.

901. Then how does that differ from the case when you are discharging the total flood?—But it is very rare for great rain to come on the top of a flood. It does come occasionally every seven or ten years, on the top of a retained flood. I have not found that condition at Athy, however, at all. With reference to the Erne, I found that there is a few days flood on those occasions, and intervals between.

902. But is not the Erne a different case, where you have a large important lake?—Not exactly, because when this flooded area is all full of water, it is pretty much the same. A heavy rainfall does not occur, as a general rule, lasting for eight consecutive days.

903. But the flooded area of the Barrow is, we may say, in round numbers 40,000 acres, and the discharging area 600,000 acres. When that 40,000 acres is flooded then the whole of the flood has to pass off?—It has.

904. Just as it will here?—Yes, provided it is actually filled.

905. What happens at the mills at each time?—

They are very much inconvenienced, and stopped probably altogether.

906. We have heard that they do not work at such times?—That is true, but our experience is that although they are inconvenienced before the drainage, if they are more inconvenienced afterwards they will claim very heavy damages.

907. Mr. Price.—You say an ordinary flood sends down 300,000 cubic feet at Athy?—Yes.

908. What happens to the mills below; are they stopped?—Yes, I think so; partly.

909. Do you contemplate making provision for carrying down more than 800,000 at a time?—I do not; in my plan I do not contemplate sending so much; I contemplate only sending 240,000.

910. Mr. Wolfe Barry.—In that case the mills would be better off?—I think so; I think the mills would be positively improved.

911. Have you made any estimate of the cost of dealing with the higher Barrow above Athy, and letting the lower Barrow aside for the present?—Yes, about £414,000.

912. Mr. Abernethy.—Does that include reservoirs? It includes reservoirs and embankments.

913. What area of reservoirs would you have?—2,000 acres, at an average of 5 feet 3 in depth.

914. Mr. Wolfe Barry.—Can you tell me to what depth you would drain the land behind the embankments?—Well, I would drain them just according to what the land required; but generally about five feet; I suppose, at the reservoirs, some of the embankments would be eleven feet high, but as a general rule the embankments would average five feet high.

915. My question was rather directed as to what depth you could get the back drainage from the drainage lands?—You could get any depth you like. I would only put them where there was a proper fall to be got in the back drainage to drain the locality.

916. How often would you be able to get an outlet for the back drainage, assuming that the land was drained three feet deep?—All along; almost the whole way.

917. I mean in flood time?—In flood time, oh, yes, of course, I bring them on to a low water level. The fall is very great in the upper parts of this river.

918. I am rather alluding to the lower part. Take from Monasterenave to Athy?—It is a very good fall.

919. Mr. Abernethy.—Would these embankments, do you think, prevent the land from being flooded?—Yes.

920. Then the water that you deal with is what falls on the lands?—Yes.

921. Mr. Wolfe Barry.—You have considered your plan and see no difficulty?—Yes; I have not gone into the details, but on general principles the work could be carried out I believe.

922. Mr. Abernethy.—Embankments of that kind exist in England to a great extent?—I look on it, then as far as Athy, you keep out of difficulty; the sinking of river is attended with great expense on account of dams and other works, but if you keep working at shallow drainages it is exceedingly cheap; in fact it is the cheapest work that you can imagine.

923. Mr. Wolfe Barry.—I presume you include the embankments for the tributaries?—Not in every case; you could not possibly settle beforehand; in some cases you might embank and in some cases you might not.

924. Have you considered at all the question of how the cost of the work is to be defrayed?—I have, of course, because any Act applicable to the land would not provide it. I am of opinion that the surrounding district relieved should in every case be tributary to a certain portion of the taxation.

925. Would you advocate a district rate?—I think the catchment area appears reasonable. It may be in certain cases that the district would go outside the catchment area. I would say the towns attached to the catchment area ought to contribute to a certain extent. Of course the contribution ought to be compulsory, for some would contribute voluntarily.

926. Would your contributory sum be made up of a general rate in addition to a rate on the localities

in which the improvements are made?—Yes, but even with this it would not make sufficient to meet the cost of the works.

227. Have you any example of a general rate having been levied?—Not for drainage purposes. For navigation there was a general rate.

228. Could you give an instance of a general rate for navigation works?—Yes. For Lough Erne there was a general rate in that instance; it came to two-thirds of a penny.

229. How far would the limit of general taxation extend from the navigation?—Well, I should say six or seven miles—fully that.

230. Chairman.—Is that general rate uniform in amount?—It is uniform in amount.

231. Mr. Wolfe Barry.—It does not vary with the proximity of the place to the navigation?—It does not.

232. Chairman.—Would you apply the same principle to drainage works?—Certainly.

233. And make it uniform?—I think the parties that are to be taxed should be bound as to whether it should be uniform or not throughout.

234. On what ground would you tax the high lands at the same rate as the flooded low lands?—Oh, not at all at the same rate. The flooded lands will be lands which, of course, will be taxed to the full value of their improvement. The high lands would be more a matter of contribution for the general benefit of the country. For instance, a great many of the county roads would be benefited by a system of drainage. We have some flooded roads in this district, and I think it would be for the general utility to the people that these roads were drained. The general health of the people, which comes upon the Poor rates, would be in a certain degree improved by the drainage by the removal of the house drainage which runs into the river. Another thing is that these lands after they

are improved are subject to rain for their improved value, so that the whole district is actually getting a relief from the benefit conferred on these flooded lands. It will come to a very considerable amount if these lands are improved to the extent of £2,500 per annum by the improvements effected. Four shillings in the pound on that would be £500 a year actually paid by the owners in relief of the general rates.

235. Mr. Abernethy.—You think that all the towns should be rated?—I think so. I had the honour of sending in my pamphlet, in which I show, I think, that drainage would result in a rise of temperature, and in a direct ratio, in which drainage is effected, this improvement in climate follows.

236. As far as agriculture is concerned it would be calculated to produce a better state of the crops?—Yes, I have no doubt the crops are kept later by lowness of temperature, a week for every degree; the ripening of corn requires fifty-eight degrees, and if it is only fifty-seven the crop will be a week later in ripening, or perhaps not ripen at all.

237. Mr. Pies.—Do you think that the mill owners below Athy would be affected by the improvements if no more than 500,000 cubic feet be sent down?—I do not think they would. I think if it was less than 500,000 they would be less injured.

238. Mr. Manning's proposal was to give 400,000?—I believe so. Mine was 240,000, or at most 300,000 cubic feet, very occasionally.

239. Is that your own proposal?—This is my own proposal—240,000 in ordinary maximum floods.

240. What is your estimate of the cost of works which would be reinforced necessary on the Lower Barrow if the plan of the Board of Works for the improvement of the Upper Barrow were carried out?—£120,000.

The Commission adjourned.

Dec. 4, 1886.

James Price,  
Esq., C.E.

## SEVENTEENTH DAY—WEDNESDAY, 5TH JANUARY, 1887.

At 36, MARKET-SQUARE, DUBLIN.

Present:—Sir James Alport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq.; J. T. Pies, Esq.

Mr. G. Henry Kinson called in and examined.

241. The Chairman.—Will you tell us your position?—I am District Surveyor on the Geological Survey of Ireland. I am a member of the Royal Irish Academy, and Vice-President of the Royal Geological Society. Lately I have been principally working at geology, but at the same time I have been taking every opportunity that I could to learn everything about the drainage and all the different natural causes that affect Ireland, and formerly I was working as an engineer.

242. Mr. Barry.—I suppose your geological studies led you into several districts as to which you will give some evidence?—Yes. The Geological Survey has led me all over Ireland. Then the effect of water is an important geological fact in calculating the effect on soils. Wherever the river comes from it brings down the different matter, and where we have the richest soil we have the greatest variety of rocks. The richest soil in Ireland is in the valley of the Lagan. There is a great variety of rocks there. At one side we have all the slate rocks, and on the other side the chalk and the lias, and the limestone and the traps; and that altogether makes up the soil of the Lagan. And the other place where we have the best soil is in the valley of the Suir. In the same way there there is a great diversity of different kinds of rocks all round, which go to make up rich soil. In the same way in Limerick the rich soil is due to the mixture of the traps and the coal measures and the limestone.

243. Mr. Abernethy.—You are speaking of the effects upon arable land, are you?—No. Mr. Barry asked me what I learned when I was engaged on the

survey, and I was just explaining the connection between geology and rivers. The effect of drainage on arable land is that you can till land that you never could have tilled before. I saw that beautifully exemplified yesterday as I was coming up just near the end of the valley called the Swillyburn. Two years ago that was all one big swamp that you could not walk on. Now it is all in most beautiful tillage, and I saw, where there was two years ago a swamp, a large crop of oats stacked.

244. Mr. Pies.—Where is that?—It is to the south-east of the county of Donegal, between Lottishenny and Strohane.

245. Mr. Abernethy.—That land was formerly subject to inundations?—It was; in a flood you could scarcely pass the road.

246. And it is not now?—No, it is not.

247. Chairman.—How has that inundation been prevented?—By opening up just near the Swillyburn in a small river that comes down from Convoys and joins into the Foyle.

248. That has no connection with the river Swilly?—No, it is in a different basin. It is in the Lough Foyle basin. It was work that was undertaken by the Board of Works very lately.

249. Mr. Abernethy.—It is a small stream running into the Foyle?—Yes.

250. Mr. Barry.—How long has that improvement been made?—It has been done since I went to live at Ramelton, and I have been there two years last May.

251. The Chairman.—How has that been done—

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at whose cost?—I would not be sure. I think Lord Abercorn's property is on one side, and I do not know whose property is on the other, and I think it was a joint work.

952. Between the lowlands?—There were more lowlands than the one in it, because it must have gone up to Rathoe and Convey. I do not know how far it has gone up, because I was never in that country since they did it, and it is only the lower part that I have seen in passing over it.

953. Mr. Barry.—Could you give us any idea of the difference in the value of land in consequence of the drainage in the instance you are giving?—I can make a guess at it. I suppose it is not worth a farthing an acre when it was begun, except for the turf; now it ought to be at least worth from 12s. to 15s. an acre. Except for cutting turf out of it before, it was really valueless. I suppose if you take all the swamp round, the parts that they could grow, and the parts that they could not, on an average it would be something about 6d. an acre, the original value.

954. Mr. Abernethy.—Simply as turf land?—No; I am only talking of the surface, for summer grazing.

955. But whatever turf was mown would remain to be cut, would it not?—Yes; the turf is all there still.

956. That still remains?—Yes.

957. And that has to be cut off before the tillage?—Oh, no, they are tilling on the top of it. In the north part of Donegal nearly all the tillage is on boggy land; as a rule the gravel is too cold. Now up where I am, in Farnah, and about all that country, the boggy flats are far more valuable than the upland, because the upland is so awfully cold.

958. I thought the practice was to cut down the turf to within a certain distance of the subsoil, and then till on the surface left?—That is in the lowland bogs. In Tipperary and in Munster we always cut the bog away, and then leave what we call the clearing. We cut down to the soil, and the upper surface of the bog is clearing; it is good for nothing, it will not make turf; there is generally about three or four feet of it, this is thrown over into last year's bog-hole, and then as you move in, you cultivate what we call the moor. But in Donegal they work quite differently: they only cut a certain thickness off the bog every year, and they go over the whole country, and then, as soon as they have gone over the bog, they till it and then they go back, and bring on new brens under their tillage.

959. And out the bog again?—Yes; say the first surface of the bog is twelve spit deep—

960. The Chairman.—Nine-inch spittings?—Yes; but in Donegal it is more, because when the breast of a bog is let, they are only allowed to cut two or three spits deep, and consequently they cut their turf a great deal longer than you cut it anywhere else, so as to make the most out of the two spits.

961. Do you mean they have longer tools?—No; you use the foot slane, but you push it down further. You take three spits off, and subvert the land, or the new surface. Then you go back over this again, and cultivate on a lower surface, and then you begin at it back again, and so on.

962. Mr. Abernethy.—Leaving the turf as a warm subsoil below?—Yes, tilling on the top of the bog always. In the lowland bogs, such as the bogs of Munster, if you could clear off the first four feet of the bogs you could till the solid bog. I knew a place near Birr, belonging to a Mr. Antiehl, where he scoured the top of the bog and burnt it, and then got rid of the covering. He did that 70 years ago nearly, and that place is now good grass bog; you can feed cattle on it, and you can run heifers on it even in the winter, and it has been in grass since ever he reclaimed it. But in all Donegal bogs there is, comparatively speaking, no clearing. The scum that you would take off the fresh bog would not be more than six inches thick, and you would be able to get good strong black turf under that.

963. The Chairman.—They clear the turf away to the soil, and they put the top scum on the soil?—In these mountainous bogs you very seldom have mud underneath, you have a silicious clay. In some places you have this silicious clay that they are making so much money out of in Scotland for making dynamite.

964. Mr. Abernethy.—But when you get down to that you must have turf above it for cultivation?—Yes, that is for good cultivation. Now, there is a part of Lord Leitrim's property where the turf is all cut away, and it is most disgusting to see the people trying to till that, it is so cold, and if it does not come on a warm year nothing will grow on it; it is too cold. I saw some oats last year when it was coming into ear, and it was scarcely above the ground.

965. Mr. Barry.—What soil would that be?—It is very silicious soil. You know quartz rock; well, it is all a sort of quartz rock.

966. Then referring to the practice in Donegal, as the drainage is made possibly to a greater depth, you not only get tillage, but you get a greater depth of bog available?—Oh, yes you would.

967. Because you told us you till, and then cut the bog again?—Yes. In that case I mentioned to you at Swillyburn, they have made a great lot of bog there available that was not available before. There is another river that has not been drained, and that is the Lissan. At Fern Lough there is a large tract of bog that cannot be cut at present.

968. The Chairman.—To come back to this particular case. What quantity of land has been drained by this process?—I could not tell you.

969. Can you give any approximate estimate?—It is one of the last drainage districts.

970. Mr. Abernethy.—I suppose they form a subsidiary drain from the bog into the river?—Yes.

971. Cross drains?—Yes.

972. The Chairman.—The quantity will appear in the tables?—Yes.

973. Then that has been improved in the way you have described by the drainage of the land by the adjoining lowlands?—Yes.

974. But you cannot tell me how many have joined?—No, I could not tell you that.

975. Mr. Abernethy.—What has been done to the pasture land in the district you have mentioned of Swillyburn?—In the lower part there is none in pasture now. It is all in tillage, that is, the part that you cross between Letterkenney and Stranahan; that was all rough broken up ground, and since the river has been lowered it has all been put into tillage. Some of it has been laid down, so that I suppose it will be pasture after this; but they seem to have put it all through a course of tillage to bring it in.

976. Mr. Barry.—To what depth, for the thorough drainage of arable land, do you consider the drainage ought to be carried?—You mean the small drains?

977. Yes?—It depends altogether on the nature of the soil.

978. Can you give us an approximation?—Well, I think every different soil wants a different depth of drain. Now, when I was acting under the Drainage Act the way I always started in a field was this. I made two parallel drains, and dug a hole between them to see if there was any water. I always made two experimental drains, and then I would put down a hole in the centre, a foot and a-half deep, and if there was water my drains were too far apart or too shallow.

979. My question was rather put as to the depth of the drains below the surface—may we take it at three to four feet for arable land?—Yes. In some places you will want to go more than that. Now, if you have a boulder clay with sand under it, if you can go down to that sand you will carry your water away from a far greater distance than if you do not go down to it. And some clays are so stiff that unless your drains are very deep they will not work at all. Then in bog if you go down to the gravel or sand you will drain a tremendous big area of the bog.

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Mr. G. Henry  
Kilgus

and if you cannot go down you will not. I have drained in Tipperary by running a cut into the gravel below the bog. I drained 50 acres by just the one cut through the whole place. I drained a swamp over 80 acres. I had intended to have through drained it, but as soon as I had made my main cut through the centre of it, it drained it so much that I was able to put it into tillage at once.

280. Mr. Abernethy.—You said the bog was ten or twelve feet thick at Swillyburn?—Yes.

281. The cross drains are three to four feet?—I do not know about the cross drains. I know that the main river is over twenty feet deep, and the main river seems to have drained nearly the whole of it without through drainage.

282. And that depth of river has been obtained by artificial means?—By regular excavation.

283. Mr. Pies.—Was it rock, or gravel, or what?—It is all peaty and alluvial deposit; a great deal of it is peat.

284. You spoke of your having been draining under the Drainage Act?—Yes.

285. What was your position then—was it as an individual?—I was under the Board of Works. I think it was under the 1843 Act; there were grants. The Board of Works gave so much money, and I was given that in instalments. When I had done so much work there was a District Inspector who inspected it, and if he passed my work I got another grant. I was superintending the work of the late Sir Henry Marsh down in Kilmurry.

286. You were then working for a landowner who was borrowing that money from the Board of Works?—Yes.

287. It was a loan of money on the security of the land?—Yes; at twenty-one years.

288. The Chairman.—Now, will you go to the heading—“Indirect advantages”—the second question. In your reply to the first heading you said you might be able to give information, and you put “ditto” to the second; probably you will favour us with the information with regard to the second?—Well, what I thought I might be able to give you information upon, with regard to that, was the improved interests, by main roads, between farms.

289. That is the third clause; but with regard to “Effects on climate of district” and “Increase of rentable value” can you give us information with regard to that?—I do not know whether any information on the effects upon climate would be of any use or not, because it is not a thing that I especially have studied. I think I would pass that over; but then, as to the increase of rentable value, of course, if you drain any land that is no use at present, you must considerably increase the rentable value.

290. You have practically given that answer in your answer to a former question, when you stated that the land was not worth a farthing an acre, and increased to from 12s. to 15s. 6.—Yes. Now, there is land about Lough Pinn, on the Leannan. There must be a couple of thousand acres that is of no use at all, except in the summer for running cattle on; and even the land that they have been tilling is affected by the floods. Last year there were ten acres of oats cut, and the big flood we had last year carried the whole of the ten acres away. That must have been a considerable loss to the farmer; and if that Leannan was deepened it would increase the value of all that land, because the land cannot be worth more than 2s. or 2s. 6d. an acre now, at the outside. So that if the place was drained, the land would at least be worth 12s. or 15s. an acre. That would make an increase in round numbers of 10s. an acre.

291. Does that 2,000 acres belong to one owner?—No; it belongs to Lord Leitrim, Captain McKay, Sir Augustus Stewart and others.

292. Can you give any reason why these gentlemen have not drained?—Well, I was talking one day to Captain McKay, and he says they get it all surveyed

and an estimate made and everything of it; but Sir Augustus Stewart is a great opponent, because he has the fishery of the Leannan, and he says that if the Leannan was deepened it would spoil his fishery. That is the reason that it has not been done; he is one of the largest owners on it, and he opposes it on account of his fishery.

293. Can you say what proportion of this 2,000 acres of land is owned by those three gentlemen; you say Sir Augustus Stewart is the largest owner?—No; he is not the largest proprietor; but he has the lower part of the river, and he has the largest interest in it. But with regard to the land I was specially talking about, the major part of it belongs to Captain McKay; and a small portion up at the west end of the lake belongs to Lord Leitrim—only a very small portion; and then the other land at the other end belongs to Sir Augustus Stewart, I think, but am not sure. It is either Sir Augustus Stewart or Mr. Swinney.

294. Mr. Barry.—Referring to the question again of the increase of rentable value, can you say when improved land comes into unimproved rentable value, does it come in immediately after the drainage is finished?—Do you mean for Poor Law purposes?

295. Yes!—Formerly when I was working you were not charged on improvements for seven years.

296. Do you happen to know whether that is the case now?—I think it is the same, but I will not say for certain. I know in 1852, and about that time, you were not rated for poor rates or anything for seven years.

297. The Chairman.—Was that way of rating due to the consideration that a large capital had been expended in draining the land; and seven years was given to enable the owner to recoup himself?—Yes, I think that was the principle.

298. Mr. Barry.—At any rate that is your impression of the present state of the practice?—Yes; I think there are some old laws upon the subject.

299. I think you were going to tell us about the improvement by intercommunication by main roads or between farms; have you any experience of that?—Yes, you will increase the value of a farm very much if you make a road into it.

300. Mr. Pies.—I think it means that the drainage admits of roads being made where places are now so swampy and wet that you cannot make a road through them; and if the drainage was carried out it would give you the means of making communications—I think that is what is meant by the question?—Yes, I see the bearing of that.

301. Have you any experience on that subject?—Well, I know that some roads about the Shannon have been made where, in my boyish days, you could not go on them at all. There was a road near Belleisle, Lord Avenmore's place, and there were sticks put up with notices on them that when the sticks were covered you could not pass. The waters never came up there at all now. Take that road at Swillyburn, sometimes you could not get across it, and you had to go all round by Rynose to get across.

302. And that involved a considerable loss to the farmer?—Yes, and to everybody. The mails instead of coming direct to Letterkenny had to come round by Rynose, and of course they were late. At the Shannon the lowering of the rock of Killoke changed all the roads near Lough Derg. There was that road from Banagher to Eyre Court, I remember when you could not pass it in the floods—when you would have to go in a boat—and now that is never flooded.

303. Mr. Barry.—Those are advantages that every member of the public in the neighbourhood gets from drainage?—Yes.

304. In addition to the advantages the farmers get?—Yes.

305. Mr. Abernethy.—How long ago is it since that

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road in the neighbourhood of the Shannon has been improved?—Well it was a short time after 1836.

1006. Was it after the regular works of the Shannon were constructed?—Yes, I remember when I was a boy, they were building the Meelick lock, and it was just after that time—that was 1836.

1007. Mr. Pies.—Is that the present Meelick lock?—Yes. It must have been later than that, because it was finished in Colonel Jones' time.

1008. Was it after the Meelick lock was finished?—Meelick lock I am speaking of. It was made a five feet navigation, and Colonel Jones put those timber beams on the top of the weir to make it a six feet navigation—he changed the navigation from five feet two to six feet.

1009. Mr. Barry.—Do you know any instances of public roads being damaged by floods?—Yes, it is a common thing in Donegal to have the road all swept away.

1010. And the expense of repairing that would fall on the county?—Yes; that river Leman, in two or three places every winter, cuts up the public roads.

1011. And increased repairs are necessary by reason of that?—Yes, because any damage like that the contractor is paid specially for.

1012. The Chairman.—I observe you pass over Nos. 2, 3, 4 and 5, but you propose to give as some evidence upon question No. 6, which is: (a) "Charge to be direct on occupiers; (b) Drainage Board to be elected by occupiers as well as owners?"—Yes. Of course the occupiers ought to have a voice in the matter, because it has been a general thing in Ireland that the occupiers paid, and yet they have had no voice in the spending of the money, and that has been always a cause of dissatisfaction. They ought to have a voice in the spending of the money that they are paying; because if it was only the owner of the land that was on the Board he might say the money must be spent in such and such a way, while the farmer, or the occupier might think it of far more advantage if it was spent in another way.

1013. Mr. Barry.—But is it a fact that at present the charge is on the occupier?—Well, it is, as a rule, though some landlords have done it at their own expense, other landlords do not, but charge so much on the rent according to the money that was spent on the land.

1014. But I mean that the first incidence of the charge is on the landlords at present—I mean a Drainage Board, if it has to collect a certain sum of money year by year, collects it from the landlord at present?—Yes, it is the landlord that is accountable for it; and the landlord must pay it; but then a great many landlords made the tenants pay each their share.

1015. Yes, as between landlord and tenant?—Yes.

1016. But this question was, that proposals have been made that the charge should be direct on the occupiers?—Well, that is, that instead of its going through the landlord's hands, the occupiers should pay it themselves.

1017. The Chairman.—That the owner and the occupier should pay in certain proportions?—Yes. Now it is all collected from the landlord: the landlord is made accountable for it.

1018. And I gather from that that you propose that the charge should be, in the first instance, made jointly on the landlord and the occupier, and that the occupier should have a voice in the election of the Drainage Board?—Yes, that the man should pay and should be allowed to have a voice in the spending of it.

1019. Then what would you propose in answer to question 7: "If drainage charges were imposed directly on occupiers of land, how should they be recovered?" How would you propose to deal with the landlord's proportion of the charges in the shape of interest or increased rent?—Well, they ought to be struck as a rate just in the same way as the county cess is struck, and a collector should come round and

collect them in the same way as he collects county cess; and if the man would not pay he would have the same means of recovering it as the county cess collector has.

1020. But assume land is let at 5s. an acre, and it is improved greatly up to the value of 15s. an acre, the cost of reclaiming the land would be borne jointly by the landlord and the occupier; but it is evident that the occupier, in the first instance, would gain the entire advantage: how would you suggest that the landlord should be recompensed his share of the expenditure, the benefit of which had gone directly into the pockets of the occupier?—Well, the occupier ought to pay more for the land to the landlord.

1021. Mr. Barry.—But supposing the rents had been fixed for a term of years in advance?—Then they must come to an agreement.

1022. How could the landlord get any more?—They would have to come to an agreement that the landlord was to be given more by the amount of interest on his money.

1023. The Chairman.—Or, again, it might be provided by an Act of Parliament?—Yes, if my land is improved from 5s. to 15s., of course I would be willing to pay more than I was before. And that should be fixed by some Act, or by a rider to the present Land Act.

1024. You would prefer its being fixed by an Act of Parliament, subject to certain tribunals settling the proportion, to its being a matter of private agreement between the landlord and the occupier?—If it was fixed by the Land Court, if the Land Court was given power to increase the rents in such cases, that would be far more satisfactory than if it was left to agreement. If it was left to agreement it would only be a source of fighting; it should be done by Act of Parliament.

1025. Now I come to Question 8. Can you give us an opinion, with regard to Sections 2 and 3, "Should charge be borne by towns in districts?" Would they be benefited in your opinion by this?—In certain cases they would.

1026. Why in certain cases, why not in all?—The great way in which it would improve the towns would be the means of communication, which are very often interrupted by floods. If these floods are taken away of course that increases the traffic into the town, and it will increase the value of a town when you can get to it more easily.

1027. Apart from the increased facility from intercommunication, are there not several indirect advantages and benefits for a town by the improvement of the surrounding districts by drainage works?—Well, there may and there may not. Because now take the Pallick property—a large tract of country near Ballinasloe. The owner improved that and drained it all and everything. At the same time he banished all the people and the consequence was he ruined Eyrestown, Laurencetown, Killinor, and Killbarnet, and did a great deal of damage to Ballinasloe and Banagher.

1028. Can you explain how?—Because there were thousands of tenants on that property before; and he first took it all up into his own hands and then he let it out in five farms, so that there are only five men to buy what thousands used to buy before.

1029. Mr. Pies.—Yes, but that is not a necessary consequence of drainings, is it?—Oh, but he did drain that.

1030. Yes, but he might have drained it and the other thing need not have followed?—Of course if land is improved there ought to be more money spent in the town. The thing is, will it be spent or not; if it is spent of course the town is indirectly improved.

1031. Mr. Abernethy.—Supposing a road in the immediate vicinity of a town is not subject to floods, but some little distance from it the road is subject to floods, do you not think the town would benefit and ought to pay for it?—Yes, in the same way as in making a bridge; the bridge may be a long way from



the place but the place has to pay its share, because it is benefited by the bridge.

1032. Are there any sanitary considerations involved in any case with which you are acquainted?—Yes, I think the health of the neighbourhood is improved by carrying out these drainage schemes. For instance, if you drain a river you get rid of fogs. I know in the head waters of the Little Bessan, I am not sure what the stream is, but it is up by Birn, I remember when that was one boggy swamp, and a wonderful place for fogs, and now there is rarely or ever a fog there.

1033. The Chairman.—Does not it follow that the sanitary improvement extends to the town as well as to the district drained?—Yes, in that case I would not be surprised, if you had a town where they were subject to ague, by drainage you would get rid of the ague.

1034. Mr. Barry.—That would not only affect the town, and improve it, but the whole neighbourhood of the area drained?—Yes, but some towns are not as wholesome when there is a swamp near them, as when that is taken away.

1035. Mr. Pim.—Then you think that would be a reason for making a charge on the towns in relation to the drainage?—Yes, if the towns got any benefit they should pay.

1036. The drainage you spoke of as being carried out by Mr. Pollock, was agricultural drainage, it was not the arterial drainage of any particular stream?—Both.

1037. The Chairman.—Question 9 says—"It has been suggested that the Government should take the initiative, or give special help in the formation of drainage districts." Can you give us any information upon that point?—Well, I think if there was not a power under an Act of Parliament, or something of that kind to form drainage districts, and some responsible person to lay out those drainage districts, they would be always fighting and disputing; because one man would want to have the district made one way and another man another way, and they would be a long time before they could come to an agreement.

1038. Quite so. Then what would you suggest should be done before the Government step in and say—"this district shall be formed into a drainage district?"—what steps would you propose that the Government should take for coming to a decision?—There ought to be a regular inspector who would have a large district to inspect; and then a certain number of proprietors in a district should agree, that they want to have the land drained. If say two thirds of the proprietors agree to have the place made a drainage district, they could send to this inspector and he could come and lay out the district, and suggest what should be done.

1039. That was not quite my suggestion. It might be that a majority in numbers might disapprove of the district being formed into a drainage district, and the few might be right in their opinion, that it would be better for the whole of the district that it should be; would you give the Government power to appoint a commissioner to hear evidence, and do you think that the Government should have compulsory powers to act upon his decision if they thought fit?—Undoubtedly. If the community at large would be greatly benefited, and some of the men did not care to let the work be done, I would have it enforced upon them just in the same way as a county road is made. A lot of people say—"Oh! the roads we have are good enough." But then the County Surveyor says that such and such a road is necessary; and that is brought before the Grand Jury and they hear evidence on it, and give their opinion to the judge and then the judge decides whether it is to be made or not. I think it ought to be done something in the same way.

1040. Now as to question 10. What precautions would you suggest against the damaging of other districts by the thorough drainage of an upper district?

—The lower district ought to be first done and sufficient waterway left to let off the water.

1041. Perhaps the lower district might be in that position already and might not feel at all inclined to join in draining an upper district, and yet the drainage of the upper district might be very essential to the inhabitants and owners of the district?—Do you mean to say that the lower district has been drained?

1042. Whether it has been drained or not it might be injured by the drainage of the upper district, although it might not have been drained itself?—Suppose there is a lower district and the present waterway is sufficient for the floods gradually coming down.

1043. Quite so: that is the case I put. If you let down the upper floods all at once you must do a great deal of damage to the lower district. Then the thing is if you are going to drain the upper district you must make larger waterways below?—The case in point with regard to that is Lough Corrib; when they made those improvements at Galway they only made it for the water of Lough Corrib, never thinking of any other districts up above. Then when they made that big river up through Turloughmore to Tuam, and opened the canal into Lough Mask, they brought down such tremendous big floods that there was no way for it to pass at Galway; and when Mr. Roberts was County Surveyor at Galway, he had gates put up at Lough Mask, and he never would allow those gates to be opened until the flood coming down the new cut to Tuam was gone; otherwise it would have swept Galway away. So that if you are going to increase the volume of water you must increase the waterway down below. In the Little Bessan it is the same thing; there they opened up all the rivers above Birn, and a flood that used to take two or three days to come down suddenly would come down in twelve hours now; and if it has been a "dripping" season and a big flood comes down it is impossible now to save the lower meadows from being flooded.

1044. Then you would suggest, as a remedy for that, that when the upper districts are drained the channels of the lower district should be widened and deepened and made of sufficient size to carry off the additional water to be brought down?—Yes.

1045. In fact the drainage district should include both the upper and the lower districts?—Yes.

1046. Mr. Pim.—The scheme should include both districts?—Yes, like the Dutch plan, they should all be put into Communes.

1047. The Chairman.—The next head is "Maintenance of Arterial Drainage Works when complete." How could the present system be improved in your opinion?—The present system wants inspecting very much in this, that there is not sufficient surveillance upon it, and that the works that are done are not kept constantly in repair. There ought to be a clerk of works who should go over every one of those big rivers after a flood, and see if there are any slips or any breaks or anything in it; otherwise you will have shoals forming from the slips of the banks, and in a very short time your river will be nearly as bad as it was before. There are some of those rivers in Galway that were done up twenty-five years ago, which are now nearly as bad as ever they were.

1048. Are those deepened rivers or embanked rivers?—No, those are all deepened rivers. They were deepened under the Arterial Drainage Scheme by the Board of Works; but the banks have slipped in, and trees were carried down, and a lot of other things have formed impediments in the stream and caused shoaling, and now that big bog of Craugh, that was high and dry, is beginning to be a swamp again.

1049. Mr. Abernethy.—In fact, nothing was done to remedy the defect caused by the floods?—No.

1050. The Chairman.—What remedy would you suggest for that?—There should be a man over all the rivers, just the same as the County Surveyor over the roads, and he should be accountable to keep all these rivers in repair. The way I would suggest would be

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that he gave contracts of rivers just in the same way as you gave contracts of roads, and that he saw that his contractors kept them in order.

1051. Then, in fact, you would have a River Surveyor as well as a Road Surveyor?—I would; but I would not have them limited by counties, but would have them divided into basins or districts. If it was all made in commons—if one river basin was a commune—then there would be a surveyor to that commune, at so much a year. If it was a large river you might have one; if it was a small one you might have two or three in a district.

1052. Then, in fact, it would not be limited to counties, but to districts?—It would be limited to basins or districts.

1053. The surveyor's duties should not be limited to a county, but should extend over, perhaps, several counties?—Yes.

1054. Mr. Pim.—Who would you have that man responsible to: what board?—He ought to be responsible in the same way as a County Surveyor is now.

1055. He is responsible to the Grand Jury now?—Well, I would make the other man responsible to the Grand Jury.

1056. You might have two or three counties in one basin?—Yes, there might be.

1057. Take the river Shannon?—Well, you could not make that all one commune—you would have to take it in levels. From Killaloe to Medick would be one commune, and then from Medick upward another commune. You would have to make a new commune at each of the locks.

1058. The Chairman.—Then, as you could not expect Grand Juries of three or more counties to meet together, would you suggest any Government control?—Should the Board of Works have power to order those works to be done if the surveyor of the river district considered them necessary?—No. I do not think it would pull well if the Board of Works had the sole control.

1059. Well, I will not say that exactly, but must not there be some machinery to enable the River Surveyor's recommendations to be carried out in case of a dispute between county and county?—If there were two or three counties that came in together I would appoint a Board out of those counties. Let the Board be regularly elected, and then let the surveyor be servant under them.

1060. Mr. Barry.—Should you give that Board rating powers over the district?—I think I would. I would make it a regular Drainage Board, something on the same principle as the Grand Juries, that they should have the charge of the land and the charge of the rates; then Government should appoint the Engineers, just in the same way as they appoint County Surveyors.

1061. The Chairman.—We will pass over No. 4, because I think you have answered the question arising from that: the next is, "Navigation."—Direct and indirect advantages or disadvantages of navigation to adjacent lands, neighbouring towns, surrounding districts?—If the navigation is carried on the present system of solid weirs must injure the land. All the navigation wants is to have their navigation; so that they do not want those solid weirs at all. The weirs ought all to be on the system of flood-gates or falling boards, so that whenever the water rose an inch above the necessary height for the navigation those gates should begin to be opened, and so to keep down the flood as low as ever you could. In that way the navigation would not do much damage to the adjoining land, while, of course, it must benefit the towns.

1062. Then you would introduce a system of sluices wherever necessary in the weirs?—Yes. I think they have done something of that kind at Killaloe. I think they have done the same at Lough Erne. What I recommend now is what I recommended on Mr. Bellesman's inquiry. But it is only very lately

that they have begun to improve the Shannon, and I have not been there since they began.

1063. But what is it you recommended to Mr. Bellesman?—I recommended that the weir at Killaloe and the weir at Medick—those were the two districts that I was interested in—should be taken away, and that they should put up systems of falling boards or sluices. That was not an original idea of mine: it was the original proposal of the man who first laid out the Shannon as a navigable river, and the solid weirs were an introduction of Colonel Jones.

1064. Mr. Abernethy.—Was it Thomas Rhodes?—Yes; I think it was.

1065. Mr. Pim.—Who was Colonel Jones?—He was the Chairman of the Board of Works at that time. He never would do any work that anybody else had laid out. He changed all the plans, too, and Griffith had to finish them, and Griffith got all the blame of the bad plans.

1066. The Chairman.—Then I see you put queries under the heads 2 and 3, under the head of "Navigation." Do you wish to say anything upon those two points?—Well, I think I have already pretty well answered them.

1067. I think you have, but do you wish to say anything more?—No.

1068. Then you have put questions which were not in the paper; the first one is as to the sluices.—The first question is sluices *versus* sluice stairs.

1069. That involves two questions. It involves the stairs necessary for the fish to get up, but the most important point is the sluices?—No. I think you do not quite understand what I intended. I meant to say that stairs are unnecessary, and that instead of having stairs every weir ought to have a sluice in it. If you had a sluice in the weir, whenever a flood came and there was superfluous water for the miller he would begin raising his sluice, and then you would prevent the mill-dam doing all the damage that they do at the present day.

1070. That I quite understood, but how would you provide for the fish?—By letting them go up the flood gates.

1071. Yes; but there might be times when the flood gates were not open?—Yes; but it is exactly twenty years ago since Ashworth made his experiment at Galway. You know the ditch at Galway where all the fish lie just below the sluice gate. He tried it in the summer. He wanted to see what force sluices could go against, and he had the sluice raised, and the fish all rushed the very moment the fresh water began to come, and they all went better-shelter up for the flood gate, and the strongest force that was coming down could not stop them. They were equal to the strongest force that he could put on. Since then I have been watching for facts, and I find that fish will not run unless there is a fresh run of water. If you watch a pool below a weir, when the mill is stopped working, the fish are lying in the pool. As soon as the mill begins to work the fish always tries to run up the tail race, and he would go up only that he cannot, and he has to come back. The fish will not run up the stairs without a flood; they will not attempt to run up. If you had a flood-gate there, instead of the stairs, if there was a fish lying in the pool, in the middle of a drought, on Saturday or Sunday, when the mill did not want the water, you have only just to raise the sluice-gate, and your fish ran up out of the pool, and to get out of the way of poachers. So that it would be, in every way, advantageous to both the fish and the land, to do away with the stairs, and substitute sluices. There is a tremendous lot of poaching goes on at the mills, because they know right well that the fish run up the tail race, and if there is fish lying in the pool below the weir, they know where it is in the tail race, and as soon as they know that they shut off the water, and put cockle nets at the end of the tail race, and there they have their fish. They catch any amount of fish in Galway that way, and

the bailiffs cannot possibly stop them, although they know they are doing it.

1072. Then take the second point—"The effects on Arterial Drainage of fishing rights"—Yes. Undoubtedly, at the first going off, the Arterial Drainage damages the fisheries, because you cut away all the shoals, and you leave the fish no place for breeding purposes. At the Little Brooma my uncle had the lower part of the river, about three miles below Berr, and we had extremely good salmon fishing; then they opened up all the rivers above Berr, and they took away all the shoals where the salmon used to have their eggs, and it was not until about twelve years ago that the fish began to come back into the river. During all that time all our salmon pools used never to have a salmon in them.

1073. Upon what grounds do you suppose they have come back?—Because the shoals are up above now.

1074. Then the shoals are increasing again?—Yes, they have breeding grounds up in the high rivers. Then there is another thing about drainage, and that is, that if you change the mouth of your stream you will ruin your fishery, because the fish will not know where to go. If you are bringing a stream or a river out, the mouth should be changed as little as possible, and if it is changed you should connect it with one of the old tidal streams from the fore-shore, so that the fish will be coming up on the old way, because if you do not leave them their old way of going they will desert it. Even, now, if a big storm comes on and

changes the fore-shore, the fish coming back seem to aim their own river. One year, at Killary Bay, the fish went altogether astray, so that Bundorough fish would be caught in the Erriff, and the Erriff fish were caught in the Bundorough.

1075. Mr. Barry.—How do you know the difference between the fish?—I could not tell you the difference, but the fishermen will. It was most amusing to go and see them selling the fish at Leman. Mr. Petrie used to buy them. You would hear fellows fighting and saying—"That is one of my fish, you have no right to it." I knew a very good river on Lord Lansdown's property, at the back of Kenmare, in the parish of Trossie, where the mouth of the river was changed about one hundred yards. It was an extremely good salmon river before that, and as long as I knew the place afterwards the fish never came into it. I believe they had to specially breed fish for it afterwards. It is very curious if you catch fish and bring them from one river to another, and let them spawn in that river; when they go to sea again they will not come back; they go back to their own river. From the Galway river they brought a great many Galway fish and put them into the Inver fishery, and they bred in the Inver fishery one year, but afterwards one of them never was seen.

1076. I think we have exhausted the last of your questions. Have you any other information that you desire to give the Commission?—Well, I think I have gone over nearly everything.

The witness withdrew.

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Mr. G. Henry  
Kinsman.

Mr. James Dillon called in and examined.

1077. Mr. Barry.—Perhaps you will give us shortly the grounds of your experience, and state your position?—I am a civil engineer, member of the Institution of Civil Engineers of England, and past Vice-President of the Institution of Civil Engineers of Ireland. I have since 1856 been engaged in laying out, designing, and constructing in different parts of Ireland railway and arterial drainage works, but particularly the latter under the Act of 1863, having expended under this Act alone amounting to £235,614. The result of this expenditure has been that 50,125 statute acres have been amply relieved from floods at an average cost of £5 7s. per statute acre, or £5 13s. 5d. exclusive of interest money and works charged to counties. I have valued many thousands of acres of land for the purpose of arterial drainage works, and also for other purposes throughout the country, and I have been professionally engaged in defining the values before and after drainage, and in defining the areas of taxation for the purpose of contribution towards the drainage works. Then taking the first heading of the printed document which has been sent to me, as regards the importance of a terial drainage to Ireland, I think having regard to the small exportation its importance cannot be over estimated, particularly as the Act of 1881 has made it almost practically impossible for the landlords to take the part in arterial drainage that they formerly took. With reference to the advantages to land reclaimed, I think that the advantage conferred on arable land by arterial drainage is greater than that conferred upon pasture land, for the reason that if it is subject to floods not only is the natural produce lost, but the whole cost of the labour connected with putting the crops in, which does not apply in the case of pasture land.

1078. That would apply to some extent to meadow land?—Of course, but not to the same extent. Then with reference to the pasture land, of course the value of drainage is very great indeed, for to my knowledge it has in cases where the land is of a good quality increased its value from ten to 100 per cent. I am able to give cases where the value has been increased 100 per cent by reason of relieving it from the action of flood.

1079. Perhaps you could give us one or two instances of that?—In the Storeyford drainage, which was designed by me, and the works successfully carried out, the occupying tenant, in giving his evidence before the Commissioners, admitted that the land was increased in value by £1 an acre by the very fact of the floods being removed. That answer and that experience would not apply to all land, because in some cases the effect of removing floods, so far from conferring a benefit, has been known to do an injury, but it does apply to cases where the land is of good quality.

1080. In that instance what relation had that £1 an acre to the previous rent?—From 15s. to £1 was the value of the land subject to floods before the works were executed.

1081. Chairman.—Then it increased in value to £1 15s. or £2?—To £1 plus the former value.

1082. Mr. Finn.—That instance is in the county Meath?—Yes. Very possibly if the Commissioners should ask me hereafter it is a case I should refer to again, but I do not propose to give any evidence upon it unless I am asked. Then with regard to the heading, "Indirect advantages (a) effect on climate of district," I do not attach very much importance to that part of the subject. I do not deny at all that in very large districts the drainage would improve the climate, but not at all to the extent that people believe—certainly not to the extent, I think, that it was said it would do in the case of the proposed Barrow drainage. My reason for thinking so is that the prevailing winds here are from the S., S.E., S.W., and so on, and there is a very interesting statement upon that matter which I was enabled to give before the Royal Commission that was appointed to inquire into the Dublin Main Drainage. It was thought that the Liffey was the cause of the injury to the health of the citizens, and I gave evidence before that Commission, based upon figures collected from the Government returns, to show that the wind blew 215 days out of the whole 365, from southern to northern points. The river runs from east to west, and it was thought that of course if the Liffey was unhealthy, the

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death rate to the north of the Liffey would be somewhat higher than the death rate to the south; but the results of the tables—and they were carefully examined into at the time—were found to be exactly the reverse; that the death rate was higher on the south than it was on the north of the Liffey, although the number of days the wind was blowing from south to north was greater in the proportion of 218 out of 365.

1093. *The Chairman*.—What are we to understand by from south to north. How far do you extend the district north of the Liffey?—In a district like this, where the winds are very variable, whatever damp or moisture would rise up from a small place its effect would be very limited. In 120 large drainage districts in Ireland the area of the saturated and flooded land only averages 4·2 per cent. of the river basins. Seven per cent. is about the maximum of the flooded districts in a river basin. I have gone into that matter very carefully, and I find that 7 per cent. is rather a high average of the injured land compared with the whole of the river basin. What I say is this, that if the valley runs east and west, and you drain that 7 per cent. of the whole river basin, and the prevailing wind always blows from the south and so on, it can have very little effect on the climate, none to the south, and certainly very little to the north. Of course it is a matter of opinion.

1094. *Mr. Barry*.—Apart from the area affected, is it your opinion that the temperature would be affected for a greater or less distance by the drainage?—So far as the 7 per cent. is concerned, there is no doubt that the climate of the 7 per cent. would be very much improved. That cannot be denied, but when you come to deal with the other 93 per cent. the improvement in that case would not be at all as great as people generally suppose.

1095. *Mr. Abernethy*.—But to the population near these rivers, or in the towns on the rivers?—I am speaking generally. I quite admit it is if a large town were in the 7 per cent flooded land.

1096. Or even a small sized town—even a village?—Well, if it was on the north side of the injured valley, it certainly would come in for a greater benefit than if it was on the south in this country, in consequence of the prevailing wind.

1097. Would not the effect of thorough drainage in the immediate vicinity of these towns be beneficial to the health of these towns?—There is no doubt about that.

1098. *Mr. Barry*.—But you would not put that too high?—No. If a man makes a statement, and attaches too high a value to it, it does no good. As I have before stated with regard to the increased value of land, it can be increased by 1s. to 30s. an acre, not by drainage, but by merely taking the flood water off.

1099. *Mr. Abernethy*.—Simply excluding the flood water?—Simply excluding the flood water. With regard to the effect upon the roads, of course taking away the floods from a district facilitates farming very much, because it reduces the cost of carriage in the district where the roads become impassable through the action of the floods.

1100. *Mr. Barry*.—Do you know many instances where main-roads are flooded in Ireland?—Yes, I do, and rendered impassable. As a rule, they are not flooded in any great lengths; but that does not affect it very much, because it is equally inconvenient to pass up to your middle for a short length and a greater length. Then, with regard to the second heading, "Amount of work remaining to be carried out," I am not aware that any accurate estimate has ever been made of the area of land requiring arterial drainage, but I believe it to exceed three millions of statute area. That is an opinion. I may be able to show you how I arrive at it; but at the same time it is not accurate evidence, it is a mere opinion.

1101. *Mr. Finn*.—Only an approximation?—Yes.

In the report of the Committee in 1875, on the Board of Works, paragraph 132, the undrained bog and marsh land is put down at 1,713,472 acres. Those figures convey no idea of the amount of land requiring arterial drainage. Much of the bog land has plenty of outfall, and much of the marsh land would not pay for the cost of arterial drainage works. From my knowledge of the country I should say most of the paying land requiring arterial drainage is neither the bog land or poor, cold marsh land, but fairly good land, situated along the banks of the small tributaries, more frequently to be found in the upper levels of river basins than at their outfalls, because the volume of water being smaller in the upper reaches than in the lower reaches of river basins, are less able to cut a sufficient channel through a soil of a given degree of hardness. That has been the result of what I have seen through Ireland—that the paying land is not always to be found along the banks of the larger rivers. I am of opinion that the area of land so circumstanced far exceeds the area of land requiring arterial drainage situated on the main or larger rivers of Ireland, and that a larger return would be secured by draining the lands on the tributaries than on the main rivers. There may be over 1,500,000 acres thoroughly drained, in addition to the three millions that I stated before.

1102. *Mr. Finn*.—Do you mean that the power of thorough drainage would follow on the original drainage of the three millions?—No; there are three million acres remaining without arterial drainage. There have been 1,500,000 acres arduously drained, if I might so express myself.

1103. *Mr. Abernethy*.—You stated that many large tracts of land could be improved without thorough drainage, by simply preventing the floods?—Yes.

1104. Have you the proportion of land of that class as compared with the quantity you have given us?—The land that can be improved simply by arterial drainage is not found on the upper reaches of the tributaries. The land that can be improved by arterial drainage only, is the land adjacent to the larger rivers.

1105. Which, you say, is the least valuable?—It very often is so. You will see that, at first sight, there is an apparent contradiction, but when it is looked into more carefully, the contradiction, I think, will disappear. There is a great deal of sixth-rate soil of an inferior quality on the main rivers. That land is very much improved by arterial drainage only. The land on the main rivers that would be improved to the great extent which I referred to when I first mentioned the matter, must be of a good quality, and if it is of a good quality, the fact of it being on the main river does not in any way interfere with the high degree of improvement; but you do not always find the very good quality on the large rivers, as we shall see presently.

1106. *Mr. Barry*.—Can you tell us what main rivers, in your judgment, would be referred to as requiring arterial drainage now?—Off-hand, I am not prepared to answer that question.

1107. The leading rivers?—The river Barrow of course is one of the leading ones. The river Shannon is supposed to still require arterial drainage. My own idea as to the river Shannon is, that if the summer floods could be regulated it is about as much as the district would be able for.

1108. *The Chairman*.—Do you mean able to supply the means for?—Yes. I was employed by some of the proprietors, as well as I recollect, to protect their interests when it was proposed to take up the navigation works, and to operate on them in such a way as to give a greater outfall for the lands adjoining the river Shannon. The Commissioners of Public Works held courts of inquiry throughout the district, and the result was that the proprietors were quite opposed to the total cost of the works being put on them, on the ground that the winter floods

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excessively increased the value of the summer crop, but that they were in favour of some moderate scheme for protecting them against the summer floods. I could provide the Commission with a list of minor rivers requiring drainage, but I did not wish to extend my evidence to a great length.

1102. Mr. Abernethy.—It has been stated that previous to the works for the regulation of the river Shannon, there were upwards of 32,000 acres subject to floods, and that 18,000 of these acres have been rescued from flooding by these works. Were those 18,000 acres freed from the summer or the winter floods?—It is in recent information that you are dealing with, there have been regulating works put into the Shannon within the last few years, and it is believed that they have been useful. I am not prepared to give you exact evidence as to what degree they have been of benefit, but it is perfectly evident, to my mind, that if the regulating works were operated upon in an intelligent way, which I assume they were, they could in the case of the Shannon, though not in the case of all rivers, decidedly give great relief to the proprietors from summer floods, in consequence of the large pond reservoirs that would be under the influence of the regulating weir. Without those ponding reservoirs the regulating weirs would not have at all the effect that they have with the assistance of the ponding reservoirs. Then with regard to heading No. 3, "How far has advantage been taken of the facilities for promoting artificial drainage," I was about to state that under the Act of 1842, there were 296,730 acres relieved from flood at a cost of £1,879,362, equal to an average cost of £7 per statute acre. Under the Act of 1863, and up to the 31st March, 1885, 74,833 statute acres at a total cost of £478,081, or an average cost of £5 3s. 10d. per statute acre, have been drained over the whole of Ireland. That makes the total number of acres released from flood 341,619 acres.

1103. The Chairman.—And the total cost somewhere about £2,300,000?—Yes; and that £5 3s. 10d. per acre becomes more remarkable from what follows; that while the price of labour during the working of the 1863 Act ranged from 12s. 6d. to 15s. per week, under the Act of 1842 it ranged from 5s. to 7s., or even less, the works under the Act of 1842 costing an average of £7 an acre, and under the Act of 1863 costing an average of £5 3s. 10d., notwithstanding the great difference in the rate of wages.

1104. Have you gone into the question of the cause of that difference?—Yes, I have.

Mr. William Barrington, Jun., called in and examined.

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1105. The Chairman.—Have you prepared any replies to those pointed questions that have been sent out?—I have.

1106. First of all, will you state your profession?—I am a Civil Engineer, and Associate Member of the Institute of Civil Engineers, practising in Limerick, though my works are in different places about the country.

1107. Will you take the questions verbatim as they appear in this printed document, and tell us what you have to say upon them?—Well, I think the first thing I can offer you any evidence upon is the second heading:—"Amount of work remaining to be carried out with advantage either to the land relieved, or to the district in general." Of course, you may take it that the importance of arterial drainage to Ireland is very great indeed; that the advantages to the land reclaimed would be very great; that the effect on the climate of district would be very beneficial; and that the increase in retailable value would be considerable. You may take all that for granted. Therefore, the first question I can offer you any decided evidence

upon is the 2nd, viz.—"The amount of work remaining to be carried out with advantage either to the land relieved, or to the district in general." The following districts are, to my own knowledge, most in need of arterial drainage:—The River Deel, in the county of Limerick; the Askeaton Drainage; the Upper River Maigue; the River Lough; the Lower River Camogue; the Attygalla Drainage; the Lower Morning Star River.

1108. Mr. Barrington.—At what time did you finish the last of those works to which you have alluded, and when were they begun?—I took up the Act immediately after the passing of it in 1863, and there were particulars.

1109. I meant approximately?—Say three years after 1863 they were commenced, and they have been finished two to nine years ago.

1110. Were they finished before the Land Acts were passed?—No. They were commenced before, and all the difficulties were got over, but if the Commissioners would care for it I can give them some very curious information as to how the Act of 1861 affected the proprietors who had previously assented to the works.

1111. The Chairman.—You are complaining of the Act of 1861, and not the Act of 1870?—The Act of 1861 is the Act that did the mischief. We had not quite time to feel the effect of the 1870 Act, but the Act of 1861 quite settled the question.

1112. Mr. Barrington.—I think the Commissioners would like to hear anything bearing on the effect of the Act of 1861.—It turns up in my further answers, and if at the end of my evidence the Commissioners think I have not given enough, I shall only be too happy to give more, because my desire is to facilitate this inquiry in every way, and give every information I can.

1113. The Chairman.—If you have anything further to add on that point, could not you give it now?—It comes under the heading No. 4, and I was going to take it up here:—"What causes have prevented a more complete adoption of these Acts?" [Adjourned for a short time.]

upon is the 2nd, viz.—"The amount of work remaining to be carried out with advantage either to the land relieved, or to the district in general." The following districts are, to my own knowledge, most in need of arterial drainage:—The River Deel, in the county of Limerick; the Askeaton Drainage; the Upper River Maigue; the River Lough; the Lower River Camogue; the Attygalla Drainage; the Lower Morning Star River.

1114. All these are rivers in Limerick?—All in the county of Limerick. Then Kilpennock, Ballinscurra, Dooghaha, and the Groody River, upper and lower—these I think, from the formation of the ground, might properly speaking be divided into two districts. Some of these I have named are small, but still they would be of considerable advantage. The amount of expenditure would be very small on some of them, and would cease below £5,000.

1115. Perhaps, after you have given the list of the whole of the districts, you had better go a little into detail as to each, to show what is really required?—I do not know what expenditure is actually required for

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each of them, because I have not made surveys of all, but I know that they require drainage, and I know at a rough guess how much they would probably cost. In the County Clare there would be the Scarriff River and the New Market River. In Tipperary there would be the Upper Clodagh, the River Suir, and the Banaha; and in Cork there is the Ovebeg River. There are many more, and I do not give you these as exhaustive, but they are the districts I positively know do require drainage. Then, the River Deel is a large district and would probably cost £30,000; the Asherton, probably £10,000; the Malaga probably £25,000; the Lough probably £12,000; the Lower Camogue, £5,000; the Alysda, £2,000.

1114. Mr. Abemethy.—What county is that in?—That is close to Limerick—near to Purick's Well station—a very small river, but very injurious to the health of the locality. Then the Lower Morning Star, £6,000; Kilspencer, about £3,000; Ballinacume, about £5,000; the Greedy River, the Upper about £15,000, and the Lower about £8,000; and the Doolish about £3,000. The Scarriff River has been estimated already and plans were prepared, but I think the provisional order fell through just after the passing of the last Act of 1883. It is a large district, and I think from hearsay the estimate was about £30,000. Then the New Market would cost probably about £10,000, and the Upper Clodagh probably £5,000. The Suir is a very large district, and I could not give you any idea of the cost of that. The Banaha, I could not say what that would cost, and the Ovebeg River in Cork probably £20,000, or maybe more. The amounts I have given are only a rough guide.

1115. Have you any information which would enable you to state what acreage in each of these districts would be benefited by better drainage?—Not in all of them. In some of them I could, because some of them I have prepared plans for already.

1116. Perhaps you will give us the acreage of those?—I could not give it now, but I could send it to the Commission.

1117. If you will send it, it can be added to your evidence; and any detailed information of that kind would be valuable—I will do so. Then with regard to question No. 3, I cannot tell you how much work has been done under the Act of 1842, but that can be got clearly from the Reports of the Commissioners of Public Works. Under the Act of 1863, I have taken the figures from those reports, and the amount expended on completed works is £503,598; on works in progress, £188,396; total, £691,994—under three-quarters of a million. Out of that £310,000 has been repaid, leaving a balance outstanding of £383,994—less than half a million for the whole arterial drainage of Ireland. With reference to the causes that have prevented a more complete adoption of these Acts I have made more full notes. The formation of drainage districts in the past (owing to the construction of the Acts under which they have been formed) have been made to depend on many circumstances which have frequently operated most unfortunately upon the design and construction of the works. For instance a district could not formerly be constituted without the assent of the proprietors of two-thirds of the value of the land to be improved, now of half provided one-third do not object. It most frequently happens that the proprietors nearest the outfall of a district object to its formation, as they often have the means of partially draining their own lands without any of the expensive operations upon the river necessary to the drainage of lands less favourably situated higher up; and it is frequently utterly impossible to persuade them that they will only be taxed in the proportion to the advantage derived by their own lands.

1118. That the lower proprietors are benefited by the drainage of the upper lands?—The way the taxation is estimated to be repaid is upon the amount of

benefit which each parcel of land derives. Therefore it follows that each proprietor is only taxed for the benefit he himself derives, but it is often impossible to convince the lower proprietors of that fact. The other less fortunate proprietors are frequently tempted against the advice of their engineers and their own better judgment, to interfere with the efficiency of the drainage, by leaving out or by reducing some of the works near the outfall, which have afterwards turned out to be absolutely necessary for the efficient working of the district. Districts have thus been trimmed and curtailed from their natural and proper areas to meet the exigencies of the particular case, as unless this had been done they could not have been formed at all; and the upper and less fortunate proprietors would have had to endure the flooding and injury to their lands, from which they have been able partially, at all events, to relieve themselves by adopting this course. I know several cases in which that has been actually done. In one of these when the district was being formed they found it impossible to get the proprietors lower down to contribute anything towards the cost. Some works would have been necessary on the lands of these proprietors lower down, as was subsequently proved from the flooding occasioned on them; but they would not assent, and as the district could not be formed without their assent, if these works were included, unless a proper proportion undertook the whole cost, they were left out.

1119. Mr. Barry.—Left out as contributors?—Yes. To remedy that there are several things I suggest.

1120. The Chairman.—What would you suggest to remedy that state of things?—There must be more compulsory powers given. The Commissioners may think that some of the suggestions I would make would be going too far, or perhaps be wild. I do not know whether I ought to make them.

1121. Make them by all means!—The preliminary inspection by an Engineer appointed by the Board of Works is not a sufficient safeguard against this being done, because unless he made a new complete survey of the river below the proposed district, on his own account, and this he is not paid for or expected to do, he could rarely discover such defects.

1122. Mr. Barry.—I do not think I apprehend the meaning of that!—As soon as plans have been lodged for the formation of a district an Inspector is appointed by the Board of Works to enquire. I know the form that is sent to the Inspector, that he is to attend at a meeting to be held at a certain date and hear objections that may be lodged. When he goes down he hears the objections and enquires into the general construction of the works, but he is not paid to go twenty miles further down the river to see if other places are likely to be flooded lower down, unless some person appears at the inquiry and lodges an objection to that effect, and consequently it is never done in practice.

1123. The Chairman.—He is left no discretion?—I think not.

1124. Mr. Barry.—He only takes a view of the works as proposed?—He takes objections and takes a view of the works as proposed.

1125. Mr. Abemethy.—In fact, sometimes the lower parts of the navigation suffer from the improvements sanctioned by them?—There has hardly a district ever been constructed in which flooding has not occurred lower down. This ought undoubtedly to be taken into consideration when the works are first done, but I think the people on whose lands such extra works are, should contribute something towards the cost of these works, because although the necessity for them is partly caused by the water being sent down more rapidly than it used to come before, still these lands would be protected and improved more or less. I think that it is unfair to put the charge of carrying

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off the water of the whole catchment basin on the backs of the people who have been energetic enough to improve their own land, and undertake the expense of carrying out works for the improvement of their land.

1125. The Chairman.—What is your suggestion to remedy that?—I think the whole catchment area should be included for reasons I will give.

1127. Mr. Barry.—I think your first suggestion was, that the inspection by the engineer appointed by the Board of Works, was at present imperfect, because he only took a partial view of the problem?—I think so. That is all he is instructed to do, and that is all the Board of Works are empowered to instruct him to do.

1128. Mr. Barry.—Simply a local man?—Exactly; but usually a very good one.

1129. The Chairman.—His powers are limited, in fact?—Yes.

1130. Mr. Barry.—Whether his powers are limited or not that is the question?—That is the question, and I do not think either the Board of Works or the engineer who makes the inspection are to blame for that being the practice. To remedy this, and across other anomalies which arise in the working out of the present Acts, I believe some amendments necessary, which I shall take the liberty of suggesting later. Since the passing of the Land Act of 1881, by which the practical ownership was transferred from the landlords to the tenants, which latter would derive all the benefits arising from arterial drainage, while the power of assessing to the formation of districts, and the privilege of paying for them primarily, remained solely with the former, operations under the Drainage Acts have almost ceased with the exception of some districts which had been formed prior to this period, or upon which works had been commenced, and some small districts which have, under special circumstances, been formed, to very little has been done. Some of those districts which were formed prior, or which were on the point of formation prior to the passing of the Land Act, have since been dropped. Scarf is one, and I know there are many others. Three districts that have been formed since the passing of the Land Act I am the engineer to. I think they are the only ones that were passed. They are in progress now, but they are small, and there were special circumstances in each case which enabled us to form them, and but for those circumstances I do not think we should ever have been able to form them.

1131. The Chairman.—In consequence of the Act of 1881?—Yes.

1132. Mr. Barry.—Give us the names of those?—The Upper Morning Star is one, the Greenagh River is another, and the Cullen River, in county Kerry, is a third. There are two or three I have in hand at present that I think I shall be able to form, but there are special circumstances connected with each of them. It is only in these exceptional cases that there is any chance of forming one now. I know some districts in which plans have been already prepared, and many most useful ones which might also be formed without any difficulty if the primary liability were changed from the landlord to the tenant. With reference to the above two points, I would beg leave to suggest amendments in the existing laws to the following effect. To remedy the defect which I have pointed out as to the area of the district—that is, the first one as to the inspection?—I would suggest that where a petition has been presented under the Act of 1863, accompanied by the necessary maps, plans, sections, schedules, and estimate, the petition must be signed by a bare majority of either the proprietors or occupiers of the lands to be improved. Under the present practice it is only necessary for the petition to be signed by one of the proprietors, and the necessary deposit lodged, to have the inquiry held. That section 6, sub-section 2, should be amended, giving the Board of Works power to appoint a Commission of three engineers, of standing and experience in these

matters, who should have all the power given to the inspector under sub-sections 3, 4, and 5, and in addition the power of extending the works below the proposed district as far as, in their or his opinion, necessary for the complete relief of the district, and the prevention of flooding to lands lower down, and the power of making the owners or occupiers of property which would be benefited by such extension contribute what in the Inspector's opinion was fair and adequate towards the cost of such increased works, even though such proprietors or occupiers were not included in original district proposed. That sub-section 5 should be amended by omitting the words, "and that the proprietors of two-thirds parts in value of such land in the proposed district are in favour thereof, and have, subsequently to the report of such inspector, assented thereto in writing." And that section 4 of the 41 & 42 Vic., cap. 59, be repealed. Under the present practice, after the inspector's report has been presented in the time to get the assents, and the assents of half are all that are necessary, provided one-third do not object. If you transfer the right of assenting to the tenants instead of the landlord, I am quite sure that in hardly any instance will you get one-third not to object. If the bare majority assented I think it ought to be sufficient.

1133. The Chairman.—If you transfer the power to the tenant from the landlords you would scarcely get a district in which you would not have one-third to object?—Yes. You would get a majority in most districts which are worth doing, but you always find among the tenants, who are a very ignorant body, and have very little knowledge of these matters and are very poor, one or two very crochety men who have notions of their own, and cannot take a proper grasp of the situation; they will object, and in all probability these would amount to one-third in value of the whole of the proprietors. Therefore, I think a bare majority ought to be made sufficient. I think that would be a vital necessity if anything is to be done under the Acts.

1134. Mr. Barry.—Would you have a bare majority in writing?—Yes, in writing; but I would have that prior to the report of the inspector. At the present moment you are completely in the dark till all the expenses have been gone to, whether you can obtain the necessary assents. If you transfer it to the tenants, you will have nobody who will provide the original expense, except the engineer or somebody interested, and I do not think this advisable.

1135. Would you suggest that every tenant should have an equal vote in deciding?—In proportion to the value of his land, as under the present Act.

1136. The Chairman.—That they should have votes according to the value of the land?—Yes; and I should not repeal the present Act and exclude the landlords from doing it if they wished. I would let the present Act be in force as far as the landlords were concerned, but I would give the tenants the power, or if you could get a majority of landlords and tenants combined, I would give them the power of assenting conjointly. As far as the public interests are concerned, it does not make any difference who assents, and if the landlords are willing to take it on their own shoulders, and the tenants of other proprietors are willing to take it on their shoulders, I should let the district be formed, and I do not see how anybody could be harmed by it.

1137. Would you apply the same rule to the landlords of a bare majority?—I think so.

1138. Mr. Pim.—In the case of the tenants agreeing to have the thing done, and agreeing to bear the charge, are they to be the only persons responsible to the Board of Works for the money?—I think so, primarily.

1139. Is it only to be their interest in the form that is to be responsible, or are the landlords to be ultimately responsible?—I think the landlords should contribute a certain portion of the tax, but the difficulty is in collecting the tax. At the present moment you have power to put a certain amount on the

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tenants, and the landlord has to be primarily responsible. He says—I do not know that I can get my rent let alone the drainage charge, but I shall have to pay the latter whether I collect it or not; and therefore he hesitates to assent.

1140. The *Chairman*.—Supposing an extreme case, that the large majority of the tenants are unanimous in favour of leaving the district, and the landlords are opposed to it, would you make it compulsory on the landlords—I would allow the district to be carried out on the guarantee of the tenants, and I would make the landlord's share of it compulsory.

1141. Although in an extreme case the whole of them were opposed to it—I think so.

1142. You would make it compulsory on them then?—I think so, because the landlords would not be liable to the Board of Works except for a small share; but the tenants would be principally liable.

1143. Still if it is to be a compulsory power and they are to be assessed although they opposed it, it seems rather a hard measure?—That very thing is in force under the present Acts with regard to the tenants. The landlords now have the right to assent to the drainage and have it carried out, and then to have part of the charge put completely upon the tenants.

1144. Assuming the landlords were all of them in favour, and the tenants opposed, would you make it compulsory on the tenants to pay?—No. Whoever assented should be the people to be primarily liable.

1145. Mr. *Pies*.—But under the present law, when the landlords agree to pay, they can go to the Board of Works and get the money assessed on the farms as an increased rent?—Exactly.

1146. Would you give them that power still although the tenants objected?—I would, and give the tenants the same power against the landlords. It has been in force for a great number of years, and I do not think it has been found to be a hardship on the tenants. I do not say, if it has not been any hardship on the tenants in the past, that it would be on the landlords in the future. The tenants should be the people primarily liable, and should the drainage not be a success or more money be expended than is represented by the amount of advantage derived by the lands—I think that it has occurred occasionally in the case of the landlords—the landlords would be only responsible for their share. I do not think you should lay down any hard and fast rule as to what share they should be responsible for, but some small proportion of it.

1147. The *Chairman*.—That should be subject to inquiry, an investigation as to the proportion in each case?—I think so, but I think that a limit ought perhaps to be fixed.

1148. A limit for what?—As to the responsibility of each party, or at least of the landlords. If the landlord carries out the work and applies to have a certain portion put on the tenants that is fair and right. The tenants get the whole benefit of it into their hands through the lands. If on the other hand the tenants assent contrary to the wish of the landlord, and the drainage turns out to be a failure, I think the tenants should have to pay the charge, but that a small proportion should still be payable by the landlord, because certainly that amount of good would have been done by it. Supposing that a drainage is estimated to cost £10,000, and to pay ten per cent on that, and that instead of costing £10,000 it costs £25,000; it would reduce the per centage to four per cent, whereas the charge under the present system would be five per cent and there would be a loss of one per cent.

1149. Mr. *Pies*.—Then the landlords would get no benefit except by an increase of rent?—They do not get an increase of rent, but they get the additional security of the collection of the rent, and the property being improved they gain to a certain extent because their security is improved.

1150. But if a charge is hanging round the necks of the tenants of £25,000 for which they only get £10,000

of value, are not you really reducing the security of the landlord for his rent. The tenants are so much the less able to pay rent to the landlord if they pay it to the Crown?—But there is a certain amount of advantage coming to the tenant. There would be the four per cent advantage.

1151. At present if monies are lent to the tenants for improvements, is not that a charge against the tenant's interest in the farm?—That is all. It is a charge on the tenant's interest.

1152. Supposing a tenant is unable to pay his rent, and the landlord evicts, does not the charge disappear?—It does not. It falls back on the landlord.

1153. In this case if the tenant undertakes to spend the money, and after the money is spent is unable to pay it, it ultimately falls back on the landlord?—It does on the farm coming into possession.

1154. It would, under your proposal?—Yes.

1155. It would be a charge on the land?—It would, but there would be a certain amount of advantage derived from the works.

1156. Mr. *Berry*.—Therefore the charge would be in the nature of a rent charge on the land?—It would. Supposing it does fall back on the landlord. The tenant has hitherto had a certain valuable claim (his interest in the land) and the landlord recovers that.

1157. Mr. *Pies*.—He gets sole possession?—Supposing he does, would not that in a certain measure rescue him for whatever loss he has sustained from having to pay the charge.

1158. I only want to understand what your opinion would be?—I think the fact of getting the tenant's interest ought to be taken as the set off against the charge.

1159. Mr. *Berry*.—Is it not the fact that a tenant can buy his land at a certain number of years' purchase now?—Yes; if the landlord consents.

1160. Supposing the landlord is charged a certain proportion of the cost of drainage, and the tenant is sitting at a judicial rent, then you mean, I suppose, that the landlord would not consent to sell his interest unless the money he has to contribute to the drainage is considered in the charges?—Of course the land would be the only security for the repayment of the charge, and supposing the landlord gives up the land to the tenant he goes out free. Whoever buys his interest has to buy his share of the charges as well. In this case the only charge I should make in the Act would be that I would make the people assent before the inspection by the officers of the Board of Works instead of after. That would make the officers of the Board of Works the proper judges as to what works should be done, instead of the people who are at present the judges, and if a man finds himself aggrieved, or thinks he is, no matter how unreasonably, he will still have the right of objecting. Supposing the inspector finds it necessary to increase works, he is a better judge of what is necessary to be done than the man is.

1161. The *Chairman*.—Are all the inspectors infallible in their judgment in these cases?—I do not think so, but they are more likely to be right than the people themselves.

1162. Then the tenants and the landlords together?—I certainly think so. In the first place they have more information at their command.

1163. More professional information?—Yes; and it is only with regard to professional questions that I would give them power. The people must first assent to the principle that drainage is necessary.

1164. Would you allow an inspector to be supreme in deciding what was necessary for a district, even against the opinions of the landlords and tenants?—On professional questions I certainly would.

1165. Mr. *Abernathy*.—That is, as to what works are necessary to be done?—The people, before any inspector is sent there, must have decided what is necessary to be done, but the question of arbitrariness



deciding how it is to be done should be left in the Inspector's hands.

1156. Mr. Barry.—How would you deal with this position of things, supposing a district has consented to the formation of a Drainage Board, by the bare majority of assents, and they have given their assent upon certain ideas, as to cost, and then when the Inspector comes he finds that the cost will be doubled. Has he the power, then, of quashing the whole business?—He should have the power of quashing the whole business. At the present moment, the Inspector has the power of doing the business, and under my suggestion there would be two appeals given. In the first place the people can object to the Board of Works, and the Board of Works are bound to take into consideration all their objections, and consider them fully before making a Provisional Order. In the next place it has to be notified by Parliament, and anybody, in those days, can get a question asked in Parliament, which would have the effect of throwing it out. I know of several schemes which have been upset by the influence of some little pettifogging man in the country, who has been quite wrong.

1157. In the event of the expense turning out, on investigation, to be much more than anticipated, the assent of the Board would not necessarily be given?—Not unless, in the opinion of the Inspector, and of the Board of Works, and of the people, it was advisable to carry out the district.

1158. You would not give the right of vetoing in that case?—I would not give the right of vetoing, but I would give them the right of objecting, and let the Board of Works consider those objections, and see if they were right or wrong, and then if the people think or feel they are aggrieved by the Board of Works, they can always oppose it in Parliament. To give you an instance of the cases in which a man objects, and as to whether such men are fit to judge of what ought to be done, I may mention the case of a district I am acquainted with. There was one gentleman, who was at the lower end, and whose agent told he would relieve his land for a trifling sum. He did not care a straw about the people above, and determined to put a stop to the whole thing. When we brought in our scheme, he undertook some small works himself which he said did all the benefit that could possibly be done to his own lands, and obtained the greatest fall that would possibly be obtained. This was done by a drain, which was 3 feet 6 inches below the level of the land, and he said we would not go an inch below that. His drain was carried in a culvert under the old river. Since then we have carried out the works, and sunk the bottom of the main river 3 feet 6 inches below the bottom of his drain, and the land has been greatly improved by it.

1159. The Chairman.—His own land?—Yes, both in the opinion of himself and the opinion of his tenant. He was there with me the other day. Any persons who may think themselves aggrieved by this course will still have the right given them by sub-section 7, of petitioning against the passing of the confirmatory Act of Parliament, and of lodging objections with the Board of Works, who should consider such objections before making Provisional Order. I further think that sub-section 8 should be amended as follows:—That the words "of such sums of money as the said Commissioners shall require," be expunged. That is with reference to the deposit. It says that when any petition is signed, such sums of money as the Commissioners may require, shall be lodged, as security for the payment of the Inspector's expenses. I think that those words should be expunged, and some definite amount, say £250, substituted. That the words, "including the expense," down to the words, "and of the appointment of such Inspector," should be omitted, and that a special sub-section should be inserted, giving the Commissioners power to pay the balance of the expense, over the £250, out of public funds.

1170. Which Act are you now referring to?—This is the 26 & 27 Vic.—the Act of 1863. The reason why I think the amendment necessary is that if you transfer the power of voting to the tenants instead of the landlord no money will be available for lodging those preliminary expenses. Therefore I think if you limited the sum to £50, which would be the outside that could be lodged, and let the Board of Works out of the public funds pay the balance of the expenses of the inquiry, it would be the best thing that could be done.

1171. Mr. Barry.—I take it the Board of Works should only be asked then to act on a vote which has been already taken?—Exactly; on being assured that the work was good, and if it was a good scheme in the Inspector's opinion that it could be carried out—that the assents have been already obtained.

1172. Under the present practice they are asked to send down an Inspector before any assents are obtained?—Exactly.

1173. Mr. Pies.—With regard to the amount to be lodged, supposing the expenditure is more than the £50, you say the Board of Works should bear it; but supposing the scheme goes on?—Then it comes out of the charge on the district. They would have the security of the £50 in doing it, and the Inspector in a short time would be able to find out whether the works were advantageous or not. Then with reference to question 6 (a), as to whether the charge should be put direct on the occupiers or not, the whole advantage which arises from the execution of drainage works is now reaped by the occupiers, except where the landlords derive indirect advantages in the greater security which is afforded for the holding of rent. The again portion of the charge should therefore be paid by the tenants, who have now a far greater interest in their farms than the landlords, but at the same time, as the real ownership of the land is vested in the latter, and that its value is increased by the expenditure, it would be only fair that they should be liable for some portion of the charge. At the same time we must bear in mind that they derive no actual benefit from the works while the lands are in possession of the tenant. Then in reply to question 6 (b), as to whether the Drainage Board should be elected by occupiers as well as owners, from my experience of the general class of occupiers I do not think it would be at all advisable to place the control of the execution of the works and the expenditure in their hands. They ought decidedly to have some representation, but if not limited to say two members in a board of ten, or a similar proportion, I do not think the scheme would work well. It must also be recollected that in the event of a tenant surrendering a farm it is the landlord's property which would be liable for the charge, and therefore they should have substantial representation upon the Drainage Board, for which also from their education and position, they are better fitted than the average tenant, who is too much under the influence of other occupiers and the labourers in the neighbourhood of the works, the execution of which in a beneficial manner this influence would often interfere with. I know now a case—I will not mention names, because it would not be right—in which we made a tenant (and he was not of the poorer class of tenants) a member of the Drainage Board. He was the man who invariably attended the meetings of the Board most regularly, and in many ways he was a great advantage to us, but if he had not the check of the other members upon him he would do a great deal of injury to the works. As a rule, the tenant lives in a thatched house in the midst of a lot of labourers, and if any of them have a spite against him they can come at him. For instance, if they have a strike on with the contractors, or are in any way aggrieved, or if some particular friend of his in the next farm wants a passage put down that is not necessary, or a thousand things done which

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would entail a lot of expense on the Board, the tenants necessarily would be much more likely to get it done than the landlord's agent, who is much less liable to local influences. Therefore, while I think that the occupiers should be represented on the board, I think it would be always well to have a sufficient number of owners to outvote them on any of these questions. Besides that, their education is not sufficient to enable them to grasp the point as well, perhaps, as they ought to grasp it, and they are all men subject to local influences.

1174. Mr. Barry.—If you have a large number of men all subject to local influences do not you find the influence of one counterbalances the influence of the other?—In the present day I think that is all the worse, because there is a local combination got up which carries them all with it.

1175. Still you cannot resist that, can you?—If you only appoint landlords and agents, the agent, perhaps, lives in Dublin, and does not care a straw about what goes on down there. His object is to do the best he can for the district, and he has no object in fighting about that which the occupiers, as a rule, I think, generally do. I never knew an instance in which they have not acted fairly.

1176. Does not it strike you at all from your experience, that if the bulk of the money is to be contributed by the occupiers, there would be a very great jealousy of the funds being administered by a Board, on which the majority would be landlords? I think you will always have that feeling now; but what should be considered is what is best for the general purpose, and not whether jealousy is excited by it or not.

1177. Would you get assents to a scheme of that sort?—I think you would. I think the great majority of the tenants would far rather have it placed in the hands—and I know from my experience of many cases—of men in whom they had some confidence, who lived near distance from them, than in the hands of men who lived all round them, and who would be jealous of Tom, Dick and Harry being on the Board. I know in many places they are as jealous as possible of any tenant who happens to be on the Board. I do not think it would interfere with the getting of the assents.

1178. Mr. Pim.—Rents are now adjusted every fifteen years under the recent Act of 1881. Supposing you put the drainage charge directly on the tenant, and at the end of the fifteen years' term he says, this has not proved anything like the scheme which was anticipated. I was engaged so much on one, and it is not doing me that amount of good. Is not there a considerable risk that if the work is not a success, the cost of it will fall back on the landlord ultimately, although the tenant originally was made chargeable with the cost of it?—There is, of course, a certain amount of risk of that, but I think the tenants' interest would be made liable for the whole thing. I think the other question would be far more likely to arise if the tenant himself has carried out the improvement and paid for it, that he will register that as an improvement against the landlord's interest, and will be very chary of renouncing it down.

1179. Because if his landlord getting the benefit from it afterwards?—He can register it as a tenant's improvement. Any money he pays under the Act of 1870 he can register as an improvement, and he would be very chary of renouncing down his own improvements.

1180. If there is a risk of the cost ultimately coming back on the landlord, I suppose that would be a reason why the landlord should have a voice in the inception of the work?—Certainly; and supposing he has had fifteen years of the charge paid for him, that would recompense him for any loss he suffered, or a great deal of it, at all events. Then, with reference to the election of boards, I have never heard of

an instance in which the present system of nomination of the Drainage Board by the Board of Works in the Provisional Order, has failed to give satisfaction, and I have never known of an instance of the members being displaced at any annual election. In fact, the latter are never held except for special reasons, such as a Board meeting not having been held for years, and most of the members being either dead or out of the country, and that it has been found necessary to elect a new Board. Even then there is often the greatest difficulty in getting two electors to attend to propose and second the election of new members.

1181. The Chairman.—How would you remedy that state of things. Would you give the Government or any Board power to re-appoint?—I am coming to that. It would be an advantage if section 14 of the 36 & 37 Vic. were repealed—that is the section that gives the power of election—and instead the power given to the Board of Works to dissolve any Board which they considered inefficient, or to be executing their powers in an improper manner; and also the power of nominating a new Board whenever such a thing was necessary. Under the present Act there is a very useful clause indeed, which says, that supposing at the time when an election ought to take place it does not take place, the members of the old Board remain in office, and it is under that clause that every Drainage Board is still in existence, and is working. At a rate, there is great difficulty in getting the members to attend. You cannot understand what a difficulty there is, and with regard to that, I think it would be exceedingly wise if a clause were inserted allowing the quorum to be reduced from three to two. It is very difficult to get three members to attend, and the way that it is got over, in point of fact, is this. There is a power given to appoint a standing committee of any member or members of the Board, who shall have power to act for the full Board. I have always got them to appoint a standing committee of the whole Board, and then they have the power to nominate any quorum they like. Whether that is strictly legal or not I do not know, but that is how it is done. I think, too, it would be very proper if some payment was allowed to members of a Board who have to come from a distance. They are very often agents resident in Dublin. It is only necessary to hold a meeting of a maintenance Board once a year, and it is rather hard to bring them down and allow them no expense.

1182. Then you would fall into the opposite difficulty that if you allow any payment you would have your meetings much too frequent?—You would only allow payment of actual expenses, and I do not think there is the slightest fear of that, because they have plenty of other things to do. It might be a payment for coming to the board, and you could limit the number of meetings to once a month, or some urgent necessity. Then in reply to question number 7—If drainage charges were imposed directly on occupiers of land, how should they be recovered?—I think by the Board of Works, in the same way as other charges are recovered by them. The board will find it easier to recover them, and it would be a cheaper way of doing it than by local people in the counties. At present I believe they find it very easy to recover charges and loans made to tenants, and the loans that are made on glebe land. I know they would find it easier than anybody else, and it could be done cheaper.

1183. Mr. Barry.—Would they find it easier to do it than through the county cess?—I think the only thing which could be collected with advantage through the county cess would be the maintenance charges. I think the payments ought to be to the Board of Works, for money which has to go to them direct and not through any county. For instance, the parishes for collection of county cess varies from 1s. to 5d. in the £, whereas the Board of Works can

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very much cheaper than that. They do it through their collector.

1184. It is a cheaper way of collecting it?—For cheaper. Then as to question 8.—"Area of contribution (a) should charge be borne by towns in district, and if so, in what proportion?"—I think it ought to be decidedly borne by towns, if the town is actually referred from floods, but not otherwise.

1185. The Chairman.—Not from a sanitary point of view?—Supposing a town is very low lying and that the floods do it a great deal of damage, I know if I were preparing the schedule of the district I should put a heavy charge on that town, but where a town is on elevated land, perhaps at some little distance away from the district, I do not think that town ought to be made contribute.

1186. Is it not often a fact that a town at a distance from the low land, is very much subject to malaria, from the low lying flooded land?—A doctor could answer that question better than I could.

1187. I thought that was notorious?—I should think it is notorious.

1188. That the health of a town is affected by the flooding of the low lands although it may not be flooded itself?—If the low lands are in the immediate vicinity, I should think it would be benefited, but I think that it would be very difficult to assess the amount it should pay.

1189. Would it not be fair to tax a town situate in the neighbourhood of flooded land, if the sanitary condition of the town be improved by the drainage of the lowland, although the town itself may not be subject to floods?—I think it would be undoubtedly in the abstract fair, but it would be almost impossible to ascertain the correct amount of taxation to put upon it. If you look at what the effect of the incision of a dike of a dike that sort would be upon the formation of districts, I think it would be well to leave it out altogether, because towns at present in this country are subject to a heavier taxation than the country as a rule. Then if you taxed them you should give them some voice in the assessing or disassessing, and if you gave them any voice in the assessing or disassessing, the valuation of towns being so high in comparison to other places they would swamp all the counties. You would find it difficult to persuade them that they derived advantage from it at all, and the effect would be, that wherever a town came in you would not have your district formed.

1190. Mr. Pim.—You mentioned with reference to one of the cases where you said that drainage was required in the county of Limerick, that the drainage would be a great advantage to the health of the locality?—Yes. There is one I have mentioned—Ballinacorney. It is close to the town I live in, and there is another point I forgot to mention with regard to that. There is a low-lying swamp which lies all round part of the town, and is flooded both by tide water and by floods; but it could be easily relieved by arterial drainage. The majority of the land is owned by one landowner, and he is an old gentleman. He says he will not incur any charge himself—he lives a long way away—by reason of having drainage works there and he does not think it would be fair to his successors, but if the tenants will agree to pay the whole charge, he will assent to the formation of a district. A great many of the tenants round are most anxious that it should be done. A deputation went round and saw the tenants; and all the tenants assented to pay the charge with the exception of one miserable fellow who has four acres. He will not assent, and until he assents the land will not assent, and consequently the work cannot be done.

1191. You say the health of the town in that locality suffers very much?—Yes.

1192. Is not that a case in which you think it would be reasonable to charge the town. Do not you think

it would be fair to charge the inhabitants?—In this case perhaps it would; some of the corporations have already been trying to get it done. Some of their sewage discharges into this river, and it is most injurious when it goes in there, to have it lying down on the lands. Then with regard to the question—"Should all land in river basin be made to contribute whether directly benefited or not? If so, in what proportion?"—I think all the land in the river basin should be made to contribute to the maintenance rate only, if not directly benefited, and I think that it should be made to contribute at an assessable rate. The reason why I think it should be at an assessable rate, and why all lands within the catchment district should contribute, is this. I think for any river a maintenance rate is almost absolutely necessary; and I do not see at all why men in one place whose lands happen to be lying lower down, and are flooded by the water from other people's lands, which comes down and collects on them, if they have sufficient enterprise to undertake works to improve their own lands, should be made to pay for the maintenance of channels which are used to carry off the water from other people's lands, it may be fifty miles away. I will give you a case in point. That is the Mullabar Drainage District. The catchment basin of this district is a very large tract of country, and the lands improved was some of the most valuable in the county of Limerick, and therefore some of the most valuable in Ireland. A portion of these lands was a regular swamp. The greater part of the year you could only boot over them, because the water came down from the hills in such rapid torrents, and instead of getting off through the natural course, they flowed back against the current of the more sluggish river, and ponded on these lands. We undertook works there as engineers to protect these lands, and the only thing we did on the low lying lands was to bank them and straighten the river. But down below where the rapid river joined the dead one, we did a considerable amount of work, in order to carry the water off when it came down, so as to give it an outlet. There was a man who lived about three miles below the end of the district, whose lands were always flooded more or less, but after these works were constructed, the floods came down so much more rapidly, that where he only had six inches of water before, he had one foot of water afterwards. That was in reality little or no injury to him, because where there are six inches of water, the feet of having another six inches in depth makes little difference. However, he took an action against us and he succeeded. It was tried, and the decision appealed from, and a special Act of Parliament was subsequently passed with regard to it, but he got £260 damages against the Drainage Board, the judges holding that if we had confined ourselves to banking our own lands sufficiently high to prevent the water coming on them, we were perfectly entitled to do it, but where we had interfered with the channel of the river a little lower down, we were not entitled to do it. We could have banked our own lands with the same effect so far as damage was concerned, but it would have cost more to do it than it cost for the outlet below. Yet the judgment was that we could not prevent water from people's lands fifty miles away ponding on ours (except by banking) if by doing that we sent our water down on somebody else.

1193. Mr. Barry.—I thought you said the judgment was you could embark but could not cut?—The judgment was that though we had only protected our own lands, the way we had done it was wrong, although in the other way it would have had the same effect.

1194. What that expressed in the judgment?—The judgment was that if we had banked we should not have been liable.

1195. You would not have been liable although the effect would have been the same?—Exactly.

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1196. Mr. Abercrombie.—Does not that point to the necessity that in all these cases the upper and lower reaches of the river should be treated as a whole—that you should have a general system that should embrace both the outlet and the upper part of the river?—Precisely.

1197. The Chairman.—We have had an opinion given that it would be better instead of confining a Board to a county or district, it should embrace the whole of a drainage district, whether it included two or more counties?—Certainly.

1198. And that a surveyor should be appointed like a county surveyor, for the district so effected by the drainage?—I shall be making that suggestion further on with regard to the maintenance only; but I think the construction of the works at present is not limited to one county, because I could give you several districts which run into two or three counties; but with regard to the maintenance, I think it should be borne by whatever lands contribute their water to the river.

1199. Mr. Barry.—Would you give your reasons for saying that the whole district should contribute to the maintenance, and that they should not necessarily contribute to the first costs?—My reason is this—supposing a man buys a property, he buys it with all its natural disadvantages. He knows what they are, and he buys it with his eyes open. Therefore, if he wants to improve that hereafter why should he ask people fifty miles away to contribute towards the improvement of his land? On the other hand, it is quite fair that people who live fifty miles away should contribute to the maintenance of the channel because their water passes through it, and, but for the channel being maintained, their water would do damage to other people.

1200. Take a district that is intermediate between a district near the mouth of a river and an upland district, and the upland district begins to drain its waters down on the middle district by improved channels; and as a consequence the middle district becomes more flooded than it was before—who is then to pay for freeing the middle district from the water that is sent down upon them and beyond them by somebody else at a time subsequent to the purchase?—My answer is this—that such a thing could never occur in practice—that in the Commission I suggest the whole thing would be put into the same district as once.

1201. But many of these districts are already in operation?—Yes; and where they are in operation wherever it is necessary to improve a river the river should be improved; and if lands along the river are improved say 5s. an acre by doing the works upon them they should be taxed for that in proportion to the 5s. an acre. But the maintenance of the whole district should be charged upon every person whose water falls into that improved channel.

1202. Mr. Abercrombie.—And I suppose you would suggest that no section of a river should be improved, whether it is in the middle or upper, without reference to the outlet?—Without reference to the outlet I think the people in the middle of a river might be allowed to improve their places provided they freed all the river down below them, and that it was all put into one district. With regard to the people above they might subsequently do their portion or they might be left out altogether.

1203. Mr. Barry.—This is taking the case of a district that has not been commenced at all. But follow out my case a little further—supposing in the instance that I gave the middle district is now unable to free itself from the water without damaging the lower districts, by putting more water down upon the lower districts; is the middle district then to pay for the expense of improving the lower district?—Certainly not.

1204. You would tax the whole?—I would tax the lower district to the extent to which it was improved,

and I would attach the balance upon the whole catchment basin.

1205. You mean supposing an improvement took place on the lower district auxiliary to the fact of carrying off the upland water from the districts above you would charge the lower district to the extent of the improvement, and the balance you would put upon the whole district?—Exactly.

1206. Therefore to that extent your answer is to be qualified when you say that none of the expenses of first construction should fall upon the lower district?—That is in the case of districts which are not yet constructed—where it is in prospect only.

1207. Mr. Pies.—Supposing you had a case in which it would take £50,000 to make the whole district right, and when you came to assess that on the lands all that you could really charge on the land was £25,000 within the district for improved value?—I would not in that case do the district. I would not do any district that was not paying as a whole.

1208. In order to see whether I understand what you mean I will put one more question. You mean that if a new district will not pay *per se* in the improvement to the land you would not do it at all?—Certainly. It would be a great mistake I think to do it, it would be throwing away money.

1209. Mr. Barry.—Therefore it comes to this, that the indirect advantages to which reference has been made, are to be set aside and treated as of no value?—If the indirect advantages could be shown to be equal to the difference in this case put forward by Mr. Pies that would be a consideration as to whether it was a paying transaction or not.

1210. But I mean advantages that you cannot turn into money?—Well, you must measure them in some way by money. For instance, the chairman put an estimate of two or three deaths per thousand; if a tax was to be put on for that it would have to be turned into money, but I think that it would be very difficult to do it. The deaths might have been, some people would think, an advantage instead of a disadvantage. With reference to the first suggestion I made as to the appointment of inspectors if you noticed I only said that they should have power to extend the works below the proposed district. I would not give them power to extend them above to the people who never want them extended at all. It is only with reference to the efficiency of the works, and the works might be very efficiently carried out for the lower district, without reference to lands higher up.

1211. But assume that the land above were benefited?—I would not give them power to extend into that unless the people above assented; I would not give power to improve a man's land in spite of himself, except for the protection of others.

1212. The Chairman.—But is not it true that all the drainage below the district would to a certain extent carry off the water of the upper district?—I would charge them with the maintenance of it, but not for the original cost.

1213. Although they might be benefited by it?—I do not think they would be benefited by it except indirectly in some of these advantages which could not be measured by money.

1214. For instance, take the case you have given, where the deepening of the river had rendered useless a man's drain that went under the river. By deepening the river by two or three feet below the drain you had rendered that drain useless?—Yes.

1215. And yet you benefited that man's land in another way?—Yes.

1216. And necessarily carried off the water from the upper land much quicker?—Yes, but he was the lowest man in the district. We would not have done that if he was up above us because we need not have gone near him at all.

1217. Assuming that the upper land is only two or three feet above the lower land, and you deepen the

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river say six feet, surely you benefit then the upper land that is only two feet above the land upon which you deepen the river; should not the upper landowner then pay?—Certainly he should, and that would form part of that district. Under the present Act you have power to tax him. Proposing him to be a tenant, I would give the bare majority of one-half power to carry it, and that would compel him to pay.

1218. I thought you said just now, in answer to another question, that the upper landowner should not be taxed for any benefit he might gain by improvement in the land of the lower district?—Yes, but I was supposing a district in which there was some natural intervening point—some obstacle which naturally divided it into two districts: supposing one basin low down here and the next basin thirty or fifty feet higher up, I would not include that district unless they wished to do so.

1219. That I can understand; but the words "upper" and "lower" mean one foot as well as fifty feet?—They do; but then I think no inspector would sanction a district in which a man was left out although his lands were benefited, when he was quite close to the place.

1220. I understood you to give a decided opinion that the upper landowner should not be taxed?—I was speaking of where there was some natural formation of land dividing it into two districts, an upper and a lower one. I would say it was all the lower district in the case that you just put to me. It would be all, properly speaking, the lower district then. Resuming my paper.—I think I stopped at the acreable rate question. The reason I think the acreable rate would be a fair one is because every acre contributes in or about the same quantity of water to be carried off, and therefore every acre should pay the same rate.

1221. Mr. Pion.—Then you would put it upon the acreage and not upon the valuation?—Yes, certainly, for maintenance—not for the original works. "It has been suggested that the Government should take the initiative"—that is with regard to question 2—"or give special help in the formation of drainage districts." I will read you my reply to that—"There are very many places in Ireland in which drainage works could be advantageously executed, but where owing to distance from and bad markets or long and difficult communication with them, it would not pay to carry out works with money borrowed at five per cent, the present minimum rate charged for these loans; but where some public employment is badly wanted every year to enable labourers to live in any state but that of the most abject misery, and in which a comparatively trifling expenditure would have the most salutary effect in checking crime and lawlessness, and in correcting dissipation." The Government have recognised that principle many times by instituting relief works. "For these reasons I think the best help the Government could give would be to lend the money necessary for the execution of these works at the lowest rate compatible with the repayment of loan, and the interest at which it is borrowed extended over a considerable period of years, say sixty-five, especially when this can be done without any loan to the Public Treasury, where the prodigious power of the country can be considerably increased thereby, and the condition of the people improved. The Treasury can borrow at three per cent, and 23 10s. 6d. per annum will repay principal and interest in sixty-five years and leave a profit. Many men hesitate to assume the whole burden of repaying loans of this sort, when their heirs (after those in whom they take no interest) will obtain the profit of their expenditure; while if they knew that the term of repayment would be extended over such a period, that those who came after them would have to bear their own share of the charge, they would gladly

assent. One instance I can give about that is, that of the old gentleman I mentioned just now. He will not assent to it because he is a very old man, but if it was a very much smaller charge, and he knew it would be distributed over other people as well as himself, in all probability he would assent. "I do not think there are many places in which the Government could take the initiative with advantage. It was tried before under the Act of 1842 (5th & 4th Victoria, cap. 89), and I have not heard that the result was such as to encourage a renewal of the attempt." I cannot offer you any evidence at all upon that point, but that is what the general opinion is. I think, then, in reply to query 10—"What precautions, if any, should be taken to prevent drainage districts being formed in such a way as to injuriously affect other districts, either by the omission of areas which ought, for physical reasons, to be included with them, or by direct injury in the way of increased floods." Upon that I say I think the best precaution that could be taken would be the appointment of the three inspectors which I suggested in the first instance under the head of alterations to the existing Acts. The 43rd & 44th Victoria is another point I would suggest with reference to it. This Act was passed with reference to the Malabar Drainage. As soon as this judgment was given against us everybody thought it was a very hard case that the Board should have to pay £500. But the result was that thereupon a great number of cases were trumped up, and since then all the tenants below think they have got a milk cow in the Drainage Board, and consequently this Act was passed with reference to that very case. In this Act there are additional powers given to construct works outside the limits of the district, but there is no power to tax people whose lands might be benefited by that. In the case in which the man recovered the £500 against us his land had always been covered to the extent of six inches or a foot of water. Now, manifestly, if the river was improved there so that his lands were protected from flooding he ought to contribute towards the cost.

1222. Mr. Abernethy.—I thought you said the floods had increased to two feet?—They had increased to some extent. We should bear some portion of it, but he should bear some portion of it also.

The Chairman.—The point was that as a matter of fact six inches would run off the land much quicker than two feet.

1223. Mr. Abernethy.—But two feet would flood more land?—No, because the land shelled in very rapidly there. The fact of his having six inches of water on his land shows that he would be benefited, and therefore he ought to contribute.

1224. Mr. Pion.—But if you had left him only as he was?—But I am speaking now only with reference to the construction in the first instance. The river has been improved since, but it has been improved at our expense.

1225. And he has paid nothing for it?—He has paid nothing for it, and we had no power to tax him.

1226. Mr. Barry.—Not only that, but he got £500 in his pocket?—Part of it.

1227. The Chairman.—And the outlet has been improved into the bargain?—Yes; but I think part of the £500 went in the improvements. I think the 43 & 44 Vic., c. 27, should be amended somewhat as follows.—That in sub section 2 the words "and confirmed by Parliament," should be omitted and a section added, giving the Provisional Order, without Parliamentary confirmation, the same validity as if such confirmation had been obtained, and in the last clause of section 3 the following words should be added, to make the section read as follows:—"And the amount mentioned in such order shall be charged upon all the lands within the catchment basin of the district." That is to give the Board of Works power to make the Provisional

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Order without the ratification of Parliament being necessary. Now we were paying, in this case, not for our own water, but for the water of people a long way above us. We had simply protected our own lands and sent it further on. Therefore the people above should pay some portion of the £400, and not make us pay all; and the addition of the words, "In making such order the Commissioners shall have regard to the final award under the Drainage and Improvement of Land Act (Ireland), 1863, in the district for which such order shall be made." That is, I would give them power to tax this man down below, and whatever damages he had sustained I would charge upon the whole catchment basin; and I would omit the clause with regard to the final award, because that fixes the cost of the works upon our lands or the intermediate district. A further clause should, in my opinion, be added, providing that after the commencement of the works of any district—at present any person inside the district is prevented from taking any action against the Board at all; he must go to an arbitrator; but persons outside the limits of the district can take action as this man did—I say where any person possessing property outside the limits of the district thinks his property injuriously affected by the works, he shall have power to petition the Board of Works to appoint an arbitrator to inquire into the matter, who, upon a sum of £50 being deposited with them as security for his costs, shall appoint an arbitrator as provided in the Act of 1863, who shall have the same power and rights as are there given; the £50 to be forfeited in the event of the arbitrator deciding against the claimant. All the costs, charges, damages, or expenses of the Drainage Board to be levied out of the maintenance rate or charged upon the proprietor and occupiers of all lands within the catchment basin, as defined in the final award. I put that in, because when a person is injured below the district it is by the water which we send on to them, and which we collect on the whole catchment basin, and not by our water alone. Therefore it would be fair to charge any damages that people get down below the district upon the catchment basin, and not upon the lands actually improved. The right of traverse of the award of arbitrator given by section 25 of the 26 & 27 Vic. completely does away with whatever advantages may be derived from his appointment. Either this right of appeal should be done away with altogether, or some more impartial tribunal than an ordinary jury substituted for it. At present the expenses of the arbitrator, where you have a costly person to deal with, is completely thrown away. You have to bring an arbitrator down—he decides, and the man only makes his decision a peg upon which to hang a claim for further damages, and he appeals to a sympathetic jury and gets absurd damages. Therefore you should take away the right of appeal altogether and leave it to the arbitrator, who would be much more likely to form a correct judgment than a jury. My experience being that a jury always gives a far greater amount of compensation against a public company or Drainage Board than the circumstances of the case require. I think that is everybody's experience also.

1228. The Chairman.—Then you would leave it either to the judge or to the arbitrator?—I would leave it either to the arbitration of three including an umpire, or to a judge. A better course, perhaps, would be, that where any person possessing lands outside the limits of the district feels himself aggrieved in any way, upon his depositing £50 with the Board of Works, they shall direct the Drainage Board to appoint one arbitrator and the complainant another, the Board having power to appoint an umpire, and failing the Drainage Board attending to this direction, the Board of Works should have power to appoint the arbitrator for them, no appeal being given from their decision. I think it would be very neces-

sary for the Board of Works to appoint the umpire and not the two arbitrators, to prevent jobs, because it is possible the Drainage Board might be in sympathy with the claimant and appoint two arbitrators who would run together. There is one point that I think might be very well added; it is not exactly arterial drainage, but it is a kindred thing—reclamation.

1229. From the sea or from rivers?—From both, but it is a thing in which a vast amount of work might be done, and the greater part of it much more advantageously than arterial drainage.

1230. Mr. Abernethy.—Define what you mean by reclamation?—I mean reclaiming sloe lands and protecting them from floods.

1231. From the sea or from rivers?—From rivers.

1232. The Chairman.—What occurred to my mind was what we have seen so frequently—immense areas of flat land that are constantly subject to floods and rendered almost valueless, in which by a little embankment on either side you would reclaim that land at a very slight cost?—Yes.

1233. Mr. Abernethy.—There are large areas of land, which irrespective of arterial drainage, could be reclaimed by embankments?—Yes, therein no doubt of it.

1234. The Chairman.—Is that your suggestion?—Certainly; and it is land which would be worth 23 sh. more when reclaimed.

1235. Mr. Barry.—I do not think we are at liberty to consider the question as to reclamation from the sea?—Not from the sea; it is reclamation from rivers I am speaking of.

1236. Mr. Abernethy.—It is prevention of floods, irrespective of arterial drainage?—It is. Then, I say, the deposit of £50 I consider an absolute necessity to prevent trivial claims being trumped up, which I know to have been done in many instances, and an utterly absurd amount of damages awarded by a sympathetic jury. I know of a case the other day, of a man who had most valuable land which was completely swamped and flooded, and all that we did there was practically to put up a bank. We drained the river of course, but the only damage done to him was a spoil bank being made upon his land, which protected him from food, and he came against us with an action. An arbitrator had awarded him £50 or £70 for the damage done to him; he appealed to a jury, and he got a view jury who gave him £600.

1237. The Chairman.—So that for improving his land he got £500 damages?—Exactly; whereas, if he had sufficient energy to do it himself, he would have had to spend money on it and lose the land into the bargain. And I know of another case in the same district. They have all been looking upon the Drainage Board as a milk cow. There was one case in which a man had built a labourer's cottage close to the road; attached to this there was an old sandy haggard containing about twenty-five perches, one heavy flood the water came up to the threshold of the door, so it had often done before, and yet he came to us and got £50 damages for an old haggard the fee-simple of which was not worth £5, therefore I think that the deposit of the £50 would be absolutely necessary; and if it had been left to an umpire this man would have lost his £50. The provisions of the present Acts as to purchase of lands and for determining amount of compensation are most cumbersome and expensive to put in operation, and in the case of small districts increase the expenditure on this item altogether beyond a reasonable proportion to the cost of works. I have heard of one case in which it cost over £80 to award less than £40. In my opinion the necessities of the case would be fully met by repealing sections 23, 24, 25, 26, and 30 of the 26th & 27th Victoria, and substituting for them a clause providing that if the owner of any property within the district required for works, or injured

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being, is not satisfied with the amount of compensation provided for him by the Drainage Board, under Compensation Schedule B, or with the accommodation works provided for him (one of the schedules which you have to lodge before you propose any district in a compensation schedule), and if a man is not satisfied with the amount provided for him in this Schedule B, or with the accommodation works provided for him, I would make this provision:—If the compensation claimed, or value of the accommodation works is less than £50, the owner shall have the right of appeal to any two or more Justices of the Peace sitting at the nearest Petty Sessions Court to the lands proposed to be taken. The magistrates after hearing appellant and the Drainage Board, to whom fourteen clear days notice shall be given, may, if they think fit, visit the lands, and shall then under their hands certify the amount of compensation which the appellant may receive, no appeal being given from their decision, no costs to be given except car-hire or expense incurred by the magistrates in visiting the lands, who may further order that either or both parties shall bear the same. In small districts—suppose one of £3,000 (and I believe districts have been adopted in which the expenditure was only £500) there is a very small margin from which to give compensation to anybody, and it is absurd to bring an arbitrator down from Dublin to award perhaps £10 at a cost of £100. The Justices of the Peace would not shirk the duty at all; they would be by far the best people, understanding, as they do, the district, to ascertain any amount of damages under £50; and there would be no need to give any appeal from their decision while the amount was limited to that sum. And it would be most necessary to prevent costs, because there are wretched little country attorneys who tramp up costs for the sake of making costs. One such case came under my notice the other day, in which we were rebuilding a bridge. An attorney wrote to a friend of his—who told it to me,—to say that if there was any damage on accident going on he hoped he would put it in his way. Now that was a direct incentive to a man to drive over it at night, have an accident, and get up a case for costs. Therefore I think no solicitors' costs should be awarded. If the amount awarded is over £50 then either the Drainage Board or the appellant shall have the right of appointing a properly qualified civil engineer each, as arbitrators, who shall have power to decide the whole matter, and make such order as they think fit as to the costs, and falling their not being able to agree then the Board of Works shall appoint a proper person as umpire, the usual rules as to arbitrations to govern their decision, and the question of costs; whichever party appeals from the magistrates' decision to lodge £50 with the Board of Works as security for the costs of the umpire. The Drainage Board should, however, have the right of entering upon the lands or taking up the property, pending the decision of either magistrates or arbitrators upon lodging to the credit of the Commissioners of Public Works in the Bank of Ireland, or as they may direct, the amount provided as compensation under Schedule B, for the property in dispute, and upon the matter being decided the latter shall pay to the person entitled to receive it, the amount of compensation which has been awarded, and if same is awarded then has been deposited with them shall add the difference to the loan made to the Drainage Board. I think that would be a most necessary clause; because when works are going on it is absolutely necessary to take up one particular piece of land, and you will often be tempted to give more than its value for it, for the sake of getting possession of it. I know in Kerry there was a case in which it was absolutely necessary to get a laggard to place spoil upon for a contractor who was doing some works, and we had to give £30 for a wretched little haggard that was not worth £5. If it was lodged in this way in the bank to the credit of the Commissioners of Public Works, there would be ample security for the money

being paid, although the amount deposited was not as much as was awarded. At present your loan is made up of so much for the compensation and so much for the works, but if a provision was put in that the Board of Works should pay the difference, and add it to the amount of the loan it would make it all right.

1338. Mr. Pies.—Have you the power of getting possession at present by lodging the money in the Court of Chancery?—No, but you have the Land Clauses Act—a most expensive thing where you want to buy only £50 worth of property. A clause might be inserted with advantage, limiting compensation for mills and mill dams to such as had been worked regularly for some twelve consecutive months, during the last fifteen years. I know a case of a mill that is interfering with a very valuable district—there are two cases in which two men bought the mills the other day; and just keep the wheel turning round, with nobody there at all, for the sake of claiming compensation if the district is ever formed.

1339. Mr. Barry.—Have you formed any opinion as to giving the whole of the catchment basin any voice in the formation of sub-districts?—No, and I do not think it would be necessary either, because they should pay for it under any circumstances. At the present moment I think there should be a District Maintenance Board for every river, whether it was ever improved or not.

1340. Mr. Pies.—Would you have the same Board for the whole of the river?—Certainly, and its tributaries.

1341. Mr. Barry.—Have you formed any opinion as to whether it was necessary that they should be consulted before a sub-district was formed within the district of the catchment basin?—I think not; I would have the same Board do works on the sub-district.

1342. You would only have one Board for the whole of the catchment basin?—Yes, excepting in the case of a very large district. Take the Shannon for instance.

1343. I thought your evidence was directed to the formation of small districts?—I am supposing now that there is no Maintenance Board on any river, except where the works have been carried out. That is the case under the present Act, and that is the case I am assuming. There you would have a small Board appointed before the Maintenance Board.

1344. In a new district?—Yes.

1345. The Chairman.—You mean that in every case there should be one Board for the entire catchment basin?—Yes, except in the case of very large rivers, such as the Shannon.

1346. I was going to put that case to you?—I think you should have one for the Suck, one for the Molitor, and one for all of those that were not really large streams. In the Suir and some of those rivers, you could not have one Maintenance Board for the whole river.

1347. Take the Barrow?—I think not. At present there is a Commission appointed to construct certain works that could be done by one Board; but if a tributary comes in 50 miles below where these works cease, there should be a separate Board for that river, because the other Board would take no interest in it whatever. I think the question as to the reclamation should come in under head 5, that is, "What changes in the law are needed in order that districts still requiring drainage may be relieved." There is no doubt reclamation in drainage, banking and preventing waters from flooding low lying lands.

1348. Mr. Barry.—But is it artificial drainage in the same sense as deepening or embankment of rivers?—I think so, because it is first embanking and then artificial drainage, and in addition to that it is generally taken in hand in connection with the deepening of the river which is banked.

1349. I do not think we ought to go into the question

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of reclamation from tidal estuaries?—Probably not under the head of arterial drainage, although money has been lent by the Board of Works for doing it, and is being lent every day. There is a large loan at present for that purpose for the Clare Slob Reclamation Works. However, if you hear what I have to say upon the subject, you can decide whether it comes within the scope of your inquiry or not. We have a Board formed on the River Cusheen, and are actually at work; but there is further improvement that might be done if we might apply some money to reclaim the land—in fact, I think we could do it under any circumstances. The question would be to whom the land reclaimed would belong, and how the profits should be divided.

1250. Mr. Finn.—That is, to combine a certain amount of reclamation with the arterial drainage?—Certainly. The operations under these Acts might with great advantage be also extended to reclamation of slob lands by the insertion of a clause giving the Board of Works power to constitute a Reclamation Board and District, on a memorial of any person or persons who will lodge the necessary plans, and deposit and give security of either other lands (which need not be contiguous to the lands to be reclaimed), money securities, stocks, house property, or other estate, the annual value of which shall not be less than one-half of the annual charges arising from proposed loan, and giving memorandum the power to purchase slob lands from the Board of Trade or other owners who shall sell to them, either at a price agreed mutually upon or fixed by arbitration; provided the proprietors of the lands adjoining the lands to be reclaimed, and to whom they must be first offered, refuse to purchase at the same rate, and to bind themselves to carry out the proposed works. I know a great quantity of land along the estuary of the Shannon which could be reclaimed if power was given to do that. The man who owns the property next this land which might be reclaimed is the only person at present who has the right to borrow the money, and he hesitates very often about taking the whole burden on his shoulders; but I know lots of places where several men would gladly join and give security to purchase lands and reclaim them. It would lead to a great amount of work, and an immense quantity of valuable land being added to the country. In the case of the Cusheen drainage the present works are confined to sinking two large cuts at the mouth of the river. The river came down in a curve originally, and the sea came up in another reverse curve, and between the two a dam formed across the river, which was increasing year by year; so that, although the natural rise and fall of the tide outside this obstruction ranged to about thirteen feet, inside it never fell more than eighteen inches below the high water level, the consequence being that the water never came below the level of the lands. We formed a Board, and we got a loan to make two heavy cuts at the mouth of the river to get through this, and to straighten the river and construct concrete training walls confining the river to the new channel, so that the rush of the water will keep these cuts cleared and secured in future. Now, there is a large area of land inside this. The river winds about and spreads over an enormous tract of slob land inside, and I think it may be necessary, in order to keep the channel to the proper depth, to construct groins sloping from the shore, the same as on the Rhine.

1251. Mr. Abernethy.—You mean at an acute angle with the foreshore?—Exactly. If this is done in time land will grow inside the groins, and will be most valuable; and if we as a Drainage Board had the power to construct these groins, and to put, perhaps, a small bank along them, that would reclaim land which would far more than pay the whole charge on the whole district, and make a profit into the bargain.

1252. But where would the profit go to?—We would the land belong to was reclaimed?—The Drainage

Board at present have not the right to buy land and to work it. The adjoining proprietors would have the right to it; but it would not be the money of the adjoining proprietors that would be in it—it would be the money of the Board. It would be altogether a very nice question. Undoubtedly it could be done with the greatest ease; but who the property would belong to eventually would be the question. At present unless you get a special bill in Parliament a man has only a right to do what lies adjoining his own lands.

With reference to the maintenance, I think there should be a Maintenance Board on every river, whether special works had been constructed upon it or not—that this board should be nominated by the Board of Works from amongst the persons who had to pay the greatest amount of rates—tenants or landlords quite indiscriminately. I think the same proposition should be preserved between the two, as suggested for other Boards, that either this Board or the Board of Works should have the appointment of a competent engineer, who should also act as secretary. That would be in order to save costs. I am maintenance engineer and secretary to several Boards now, and we have no difficulty at all in collecting the charges, but we have great difficulty in getting the Board to meet. I think the reason why the proposition should be kept so low as two to ten is, that you will find it much easier to get the tenants to attend a meeting than you will to get the landlords or the agents; and unless you had it kept in a very small proportion the probabilities are that they would outvote the others. In my experience the greatest difficulty to be met with under the present system is the extreme difficulty of getting a quorum of the members to attend. I know many districts upon which works have been executed, and in which the maintenance has been entirely neglected for years, so that the works which have been carried out have become altogether useless. To meet this, I would suggest the engineer should make an annual inspection and report upon the state of the river in his charge, and prepare an estimate and schedule showing the rate which it would be necessary to strike to carry on the works for that year—that he should then summon a meeting of the Board, and calling their attendance, should present the above documents to the Board of Works, who, if they approved of them, should direct him to publish notices, and send them to the members of the Maintenance Board, stating that as they had not attended the meeting the rate should now be struck, and requesting all persons liable to lodge the rate in some bank which should be appointed treasurers, and from which money could only be drawn by cheque, signed by two members of the Board and the secretary, or by order of the Commissioners of Public Works, on the secretary's cheque in defined amounts. I know we have no difficulty in collecting the rate in that way in these districts, but unless we selected men that we could depend upon coming to the meeting when necessary, we never should have a meeting; and even then it is difficult to get one. I think that the engineer should obtain tenders for the necessary works, and have them executed by contract, subject to the supervision of the Maintenance Board, if they will act, and if not, to that of the Board of Works. In reply to query 3, I have always found the powers given by the present Act sufficient to enable the rate to be collected.

1253. Mr. Barry.—Going back for a moment to No. 2, supposing the engineer neglects his duty?—It would be a bad case then.

1254. Is not he a paid servant of the maintenance board?—He is; and although the maintenance board neglected their duty, I think they would see that he did not neglect his.

1255. Mr. Finn.—How would they know if they never attended?—They live along the lands, and they know right well when there is anything to complain of. He will get heaps of letters complaining of this and that trivial little thing, that he will have to go



and see to. The Board of Works in any case would have power to supersede him, and to supersede the whole Maintenance Board.

1254. Mr. Barry.—I wanted to know how the Board of Works would be brought into operation. Supposing the engineer neglected his duty, and did not do those necessary works, and the board of management neglected theirs, how would the central Board of Works in Dublin know anything about it?—Somebody would let them know. If there was any inconvenience from the work not being done they would certainly be let know of it.

1255. You mean I suppose from a resident occupier.—Besides that there is another thing; the engineer and the secretary would have to be paid out of what rates he collected, and therefore he is pretty sure, in order to get his own salary, to collect the rates at all events, and in order to collect the rates it is necessary a visit to the district should be made.

1256. The Chairman.—I think Mr. Barry referred more particularly to the neglect of the duty as regards the maintenance of the works themselves, both by the engineer and by the Board of Maintenance. How then would the notice come to the Board of Works? No doubt there are plenty of residents, either landowners or occupiers, who would see the works being neglected, and complain for their own sakes to the Board of Works?—Yes; or they would attend the meeting in order to object to paying the charge, and to the engineer going on collecting the charges and doing no works. I have always found the powers given by the present Act sufficient to enable the rate to be collected. But if you extend the area of the districts considerably, it would be well to make a certificate signed by the Chairman and Secretary or by the Board

of Works, sufficient evidence of the amount, and striking of the rate, so as to avoid bringing them to distant courts to prove the fact in person. As maintenance works are necessary to enable the river to carry off efficiently all the water which falls into it, I think that this rate should be a reasonable one, equal on all the lands within the estimation basin of the river. It is, in my opinion, most unfair that the whole of this rate should fall upon those proprietors who have had sufficient energy to improve their own lands. Fide case of Malabar. I do not apprehend any unreasonable difficulty in the collection of this rate, as it could easily be ascertained, and calculated upon the area of each farm, and I think this rate should, like the county cess, be payable half by the landlord, and half by the tenant.

1257. Mr. Pies.—In the case of mountain land, if you charge the maintenance on the area do not you think you would be putting an excessive charge upon it?—In the case of almost every district the maintenance charge would be very small, and the area would be very large, so that it would not come to more than a fraction of a farthing per acre in all probability. In reply to query four—that is the relative advantages of large and small districts—I say: This, if done on a large scale, and all the rivers in one neighbourhood or district put under the supervision of one chief officer, the rate would be a mere trifle, and the advantages derived by the tenants, labourers, and country, generally, would be enormous.

1258. You have nothing to say upon the subject of navigation?—I have never had any professional engagement in works for navigation.

Adjourned to to-morrow, at 10.30.

## EIGHTEENTH DAY—THURSDAY, JANUARY 6TH, 1887,

AT 35, MINSTER-SQUARE, DUBLIN.

Present.—Sir James Alport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq.; J. T. Pies, Esq.

Mr. John Hill called in and examined.

1261. The Chairman.—Have you prepared any statement to lay before us?—I have. I have put my notes on the printed paper of questions you sent to me.

1262. Perhaps you will kindly favour us with your remarks upon the first question in this list. I believe you are surveyor for the county of Clare?—I am.

1263. How long have you held that office?—Fifty years.

1264. And you are thoroughly acquainted of course with the whole district?—I am. I am a member of the Institution of Civil Engineers, and I have executed several Drainage Districts and have acted for the Board of Works as Inspector of six or seven Drainage Districts. The first question is as to the importance of arterial drainage in Ireland. It is particularly applicable to the country, inasmuch as the centre part of Ireland is a depressed flat plain and the high grounds are round the coast, and the rivers have all their sources in the central part of Ireland, are of slow movement, and the slightest impediment floods the land on each side of them, so that arterial drainage is particularly applicable to this country. The advantage to waste land is in some cases to enable it to be utilized, and in every case in which it affects land, it improves it in value, as it can be tilled at all seasons and the produce is always increased in quality and quantity. In pasture land it changes the grasses. The aquatic and semi-aquatic grasses die out, and the apparent yield of grass is diminished in nearly every instance that came under my observation, but the quantity as well as the quality of the grass improved in a few years from two

to four fold. At first the grass was diminished but it improved in quality.

1265. Mr. Abernethy.—That is to say the character of the grasses was changed, aquatic grasses died out and other grasses took their places?—Yes, but in the process of dying out it is apparently injured instead of improved. With regard to the effect of arterial drainage upon the climate of the district, that will be spoken of by people who are very much more competent to give an opinion upon it than I am, for it is a physical question. I know in small districts that I have been employed to drain, the improvement of the adjacent land has been very marked. I do not exactly understand the meaning of the question (6) "Increase of rateable value," except it applies to the land that is improved. There is no doubt that it increases its rateable value.

1266. The Chairman.—It is more with reference to this question,—what increase in the rateable value has occurred in consequence of the improved drainage?—That is of the land?

1267. Yes?—Oh, there is no doubt about that at all. The value of the land is, in some cases, more than doubled, from that down to a small percentage of improvement according to the quality of the land.

1268. Can you give us any approximate figures with regard to quantity and actual value?—Well, I will take the instance of a district where there were 2,050 acres of land drained in the county of Clare: the Six-mile-bridge district. It was drained under my own direction, and there were about 2,000 acres of land relieved from floods and from the injuries in-

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fiscance of water. The increase in value of that has been about £1,400 a year on 2,000 acres.

1268. Mr. Pies.—In the valuation for taxation purposes?—Yes, in the valuation of the land.

1269. The Chairman.—About 14s. per acre?—Yes, about that upon the whole of it: some was improved to 30s. an acre.

1270. Mr. Barry.—How soon after the execution of the works does the new assessment for taxation take place?—I think they must be completed and executed seven years before they can make the new assessment.

1271. The Chairman.—It may be quite right to give seven years, but what period does it take to show a decided improvement in the land?—In some of that land I have referred to, the improvement was immediate, because it relieved them from the danger of floods destroying the hay.

1272. Varying from one, to two, three, or four years—would the maximum of improvement occur at the end of two or three or four years?—I should say in some parts of that, it took four years; in some, the improvement was immediate; because it relieved them from the danger of floods.

1273. What was the value of the land before the drainage was effected?—As far as I recollect the highest value that was put upon it was about £1 an acre.

1274. And the drainage increased it up to about £1 14s. 4.—Where I am speaking of, the land at £1 an acre was improved up to £2 10s. per statute acre.

1275. Mr. Pies.—You gave me a figure of the increase in value in certain places which you have had to do with; was that the value to the farmer or for taxation purposes?—To the farmer.

1276. Can you give me any figure as to what the valuation for taxation purposes was increased by on that particular area that was drained?—I could not.

1277. And do they revalue at the end of seven years?—They do not—the valuation is not changed, it is only modified; and I do not think they revalue it at the end of the seven years. It is a thing that I am not very conversant with. Then with regard to "Improved communication by main roads and between farms." I do not know that there is anything of that sort takes place to an appreciable extent.

1278. The Chairman.—Not in Clare?—No, nor any place in Ireland that I know of.

1279. Mr. Pies.—Are there not cases where the roads were occasionally impassable by reason of floods, and now, the floods being removed they are open for traffic?—It is impossible to that extent; but this question looked as if it pointed to new roads or new communications.

1280. Mr. Abernethy.—If the land subject to floods becomes thoroughly drained, new and more efficient roads can be made?—Yes, they can; but that is inappreciable, I think.

1281. Mr. Barry.—The Commission have seen some roads which are flooded in flood time, and where there are raised foot-paths for foot passengers to use, and vehicles have to go through the water?—Yes, that takes place in several places where there is an Arterial Drainage at all and where there are dips in the roads.

1282. The Chairman.—I suppose your remarks up to this moment apply chiefly to the drainage that has been effected in the Six-mile-bridge district?—Yes.

1283. You do not go beyond that?—Not with regard to the valuation and the increase in value.

1284. Several drainage schemes I am have been carried out in Clare?—Two large ones besides. I am sorry to say that the increase in value on them has not been so much as it ought to have been; they are ineffectually drained.

1285. To which do you allude?—The Fergus drainage and the Quin drainage.

1286. Mr. Abernethy.—In that answer as to the valuation of the land when drained, do you make any distinction between pasture and arable land?—We

have very little arable land now, it is pasture chiefly. But I did make the distinction in estimating the improvement, because it is here separated. With arable land, as soon as it is perfectly drained, they are enabled to till it at once, which could not be done before.

1287. The Chairman.—Your particular drainage extends from a place called Tom Grassy down to Six-mile-bridge?—It is near to Tom Grassy.

1288. Mr. Barry.—Is it your opinion that the winter floods are of value to the callows?—I am sure they are if they could be controlled, but I would not like to see the land subject to them.

1289. Mr. Pies.—But you say that where you drain, grass lands the quality of the grass changes, you get different grasses growing?—Entirely.

1290. Do you think that in the case of land subject to winter floods, if those winter floods were under control, that you would get an improvement in the quality of the grass?—No, you would not. The irrigation of land does not improve or change the quality of the grass the same as drainage does.

1291. You must get rid of the water altogether?—Altogether, if you want to change the grass.

1292. Mr. Barry.—Is it your opinion that if the floods are excluded in the winter, as well as at other times of the year, you will reap greater advantages from a system of drainage than if the winter floods are allowed to overflow the callows?—That is my opinion, decidedly.

1293. Mr. Pies.—We have been told by some persons that the winter flooding in the neighbourhood of the Shannon is a great advantage; that the water brings down what amounts to a sort of manuring of the land, are you of that opinion?—I am not. I am aware that this is the general opinion of the people along there, but they have had no opportunity of comparing it with land that has been thoroughly drained.

1294. Then you are of opinion that if the winter floods could be excluded altogether from the land in the neighbourhood of the Shannon, which is now subject to winter floods, you would get an improved quality of grass upon this land?—I have not the least doubt at all about it. There is next a question here—"How far has advantage been taken of the facilities for promoting arterial drainage?"

1295. The Chairman.—Then you pass over No. 2—have you no remark to make upon that?—"Amount of work remaining to be carried out with advantage to the land relieved or to the district in general?"—Yes, I have. In addition to the districts that have not been operated upon at all, I believe that nearly every district that I am acquainted with that has been drained under the Act of 1845 would require examination and consideration again—they are ineffectually drained.

1296. That suggests one or two questions—first of all, have these drainage works been kept up?—Some of them have.

1297. Effectually?—I think so.

1298. And others have not?—I will just take the two in Clare. The drainage of the Fergus has been kept up moderately effectually from the time it was completed.

1299. There you have a Drainage Board?—We have a Drainage Board, and they employ an engineer to look after the works, and pay for the expense of clearing the works.

1300. How is the cost of that engineering paid—by the county?—No, it is levied by a rate on the improved land.

The Quin district was neglected for a time, and one of the proprietors, under the provisions of the Act of Parliament, applied to the Board of Works, and they got it drained—I mean the drains were cleaned out, and made as effectual as they were when it was opened, or said to be completed.

1301. Have you anything else to suggest with the view to insure efficient works being made from time to time, and the maintenance being continued from year to year, so as to keep up the efficiency of the

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drainage?—No, I have not, for this reason, that I consider the legislative or the legal powers to do so quite adequate, and that in case of negligence, any one of the owners or proprietors that is injured by the neglect of them, has a very summary remedy to compel them to adopt the maintenance of them.

1303. Yes, but it appears that although they may have a summary remedy, they do not apply it. Would you suggest any Government official or surveyor who should call upon these Drainage Boards from time to time to perform the necessary works?—I would not. I think that if the people themselves are not alive to the advantage of maintaining the works, I would not meddle with them.

1304. Mr. Pitt.—With regard to those two drainage districts in Clare that you mentioned, that are not as thoroughly kept up as they ought to be, do you think it is entirely the fault of the people in the neighbourhood?—No, that is not what I wish to convey at all; but that they were originally inadequate.

1305. You mean that the engineering was bad originally?—Yes.

1306. The Chairman.—That alters the view altogether. Do you find from your own experience that the local Boards are anxious to keep up the efficiency of the drainage?—I only know one Board that has neglected to do so out of three. The Six-Mile-Bridge Board is effectually kept up at present; so is the Fague Drainage, so far as it was in their power to do, from the time that it was said to be finished by the Drainage Commissioners.

1307. Now, as to No. 3. "How far has advantage been taken of the facilities for promoting arterial drainage?"—According to Sir Thomas Larcom's evidence before the Committee of the House of Lords in 1853, there were 550 works applied for, and 122 have been carried out. That was under the Drainage Commissioners, and under the second Act, according to the report of the Board of Works in 1855, 30 districts have been completed, 10 contemplated since the date of the report, and a few more even since that.

1308. And you put a query here—"What causes have prevented a more complete adoption of these Acts?"—I would rather not say anything about the former Act; it is quite new, and I suppose these never will be anything at all adopted similar to it. With regard to the last Act, when it was passed in 1863, the means of procuring funds to carry on the works were wholly inadequate for the circumstances of this country. The funds were to be borrowed on debentures, and a complicated system of procuring funds was enacted. Since then, that and several other defects in the Act have been remedied from time to time by Acts of Parliament, and now the whole of the funds are lent by the Board of Works. The time of notices, and delays of that sort, that were in the arrangements for constituting these districts, is shortened, and I really do not see any amendment that I could suggest beyond what the present state of the law provides.

1309. In other words, you think the present legal powers are amply sufficient to execute the works, and to maintain them after they are executed?—I do believe that.

1310. Mr. Barry.—That refers to Nos. 4 and 5. It has been given in evidence that the Land Act of 1881 has interfered with the carrying out of the Act of 1863?—Decidedly; but that will come under the next question about the charge to the occupiers.

1311. I thought it would probably come under No. 4.—What causes have prevented a more complete adoption of these Acts?—The Land Act is a very recent thing in comparison to the period over which that has extended, and it has only affected one or two districts that I know of at all. It is a curious thing that since the Land Act, there have been more districts constituted than there was in a similar period previous to it.

1312. The Chairman.—Under the Act of 1863, I suppose?—Under the Act of 1863. The reason that

the Land Act has interfered at all is this, that there is a great difficulty in the proprietor, who is primarily liable for the charges for these works, levying that from the occupiers.

1313. Do you think that any alteration in the law is necessary to make it more equitable upon the owner and the occupier?—That is what I am going to say in answer to No. 6. It is my own opinion very strongly that the occupiers should be charged directly instead of indirectly through the owners, and that they should be made liable for the charges.

1314. For the whole charge, or for a proportion of it?—I declare I think the whole charge. I do not see that the benefit to the owner will ever occur. The occupiers have nearly all of these fifteen years stateable losses.

1315. At the end of the fifteen years is it your opinion that the land would not be of more value to the owner?—I am afraid not. I am afraid that at the end of fifteen years there will be a great difficulty in effecting any increase in the rental of those occupiers. I do not see the slightest prospect of it.

1316. Mr. Pitt.—Of course if the occupier had paid the cost of it originally there would be no reason why the landlord should get anything more?—No.

1317. But you are of opinion that if it was the owner who paid originally he would have great difficulty in getting anything back from the tenant?—I am afraid he would be perfectly powerless to do it. Then following that, it is my opinion that the Drainage Board should be elected by the occupiers as well as the owners.

1318. If the occupier paid the whole charge why should the owners take any part in the election of the board?—In nearly every case the owners are the occupiers of part of the land.

1319. As occupiers of course they would have a vote then?—Yes, but I would give them no vote otherwise.

1320. No vote as landlords?—No.

1321. But would the charge be a charge upon the land, or only upon the occupiers' interest in the land?—It would be on the land itself.

1322. Then you see it might ultimately fall back upon the landlord, because if the occupier were incapable of paying his rent and the interest together the landlord might be obliged to eject him. Would the landlord then come in in your view to vote?—He would be the occupier then, and have a vote, and would have all the chargeability and the interest of the man who was there before him.

1323. But you would give him no power or voice in the first instance as to whether the tenant should charge the land for this improvement or should not?—I think not.

1324. Mr. Barry.—It has been stated to us as an opinion that in many of the districts the occupiers would have greater confidence in a Board which was partly, and to a large extent, composed of landlords. Would that be your opinion?—It would not. I think they would like to have a voice in the choosing of them. I would certainly suggest that there should be a sufficient qualification, so that it would not be made a mere popular Board, but sufficient qualification so as to ensure having people of sufficient position and intelligence.

1325. What qualification would you suggest?—Certainly those who are rated to at least £50 a year.

1326. That, you think, should be the minimum qualification?—Yes.

1327. Mr. Abernethy.—It was stated that in many districts the occupiers are a very poor class of men, and in those cases they would not be able, in all probability, to pay the extra charge on the land?—Well, that is not the result of my observations. They are not generally a poor class of men who occupy these flooded lands. They could not be made use of by more cottiers or small farmers; they could not live upon them or make sufficient use of them; they are generally large holders.

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1328. Mr. Pies.—Then the smaller farmers are generally on the upland?—Oh, yes; they could not live on the flooded lands. There are some, of course, but it is to a very small extent. There is a question here—No. 7—with regard to how the charges should be recovered. Well, I do not see any difficulty in it whatever. There may be a loss of five per cent or something like that, where there are a few persons interested in it, but there would be no difficulty in recovering the rate any more than there is at present.

1329. What machinery would you recommend?—The same machinery that there is at present.

1330. Collected by the Board of Works?—Collected by the Board of Works and by the Treasury Solicitor. He generally serves them with notice that if they do not pay within a certain time they will incur a penal percentage which is increasing, and they do not choose to incur that penalty—they pay their money.

1331. The Chairman.—The next is No. 8. What do you say with regard to that?—That is about the incidence of the charge to repay the loan and maintain the works, so that other areas should be included in addition to the lands directly benefited; and it requires more consideration than it has been in my power to give to the subject, and any opinion offered by me on the matter is given with great diffidence. Where the drainage of a town is directly benefited there does not seem to be any doubt but that it should contribute; and where an area contributes to the cause of injury in fact, causes the injury, it seems reasonable that it should contribute to the expense of the remedy, but to what extent, or in what proportion, it is not in my power to form an opinion. There is no doubt it will be the ground of great dissatisfaction if a tax is laid on people for what they will receive no direct benefit from, and from which they will know that others will derive direct advantage.

1332. Do you think that the towns benefited indirectly from an improved sanitary condition ought to contribute?—You see what is in my head is a late investigation that there has been of the Barrow. That is a district that I know as well as those that I have executed. I have been employed in and about it a good deal. There are two or three towns there in which they cannot drain the houses and in which the floods come into the streets. With regard to those towns, there is no doubt on my mind that they should bear a fair share of the charge for improving the river, or any towns situated like them.

1333. But assume that the town is a little above the highest flood, it might receive indirect benefit from a sanitary point of view. Would you tax that town in consequence of that benefit?—If the thing was left to myself I believe I would; but I could give you no reason for the formation of that opinion. I am inclined to that, but I could give you no sufficient reason for it. I would look upon that the same as the whole of the district round about it.

1334. Mr. Abernethy.—Although the town itself may not be flooded the means of communication, the roads leading to the town, may be subject to floods. Now that must be a serious injury to the town for the time being?—I understand that perfectly.

1335. In that case should not the town contribute in some form?—Well, that is a view I never took before. There is no doubt that they will be directly benefited by clearing the roads. Now take Mountmellick on that very River Barrow. I went to it under extraordinary difficulties during flood time.

1336. Mr. Barry.—I think you have severely perhaps discussed the question of whether the whole river basin should contribute or not?—I am in doubt about that, and I have not sufficiently formed a determinate opinion to say. I am inclined to answer that in the affirmative, but I would have great diffidence in offering an opinion. "It has been suggested that the Government should take the initiative, or give special help in the formation of drainage districts." What I say about that is this, it would be most desirable that each river and its watershed or catchment basin should be

treated as a separate entity, and in every case that a board should be formed for that purpose, it would be reasonable for the Government to assist it by contribution towards the examination and plans, to be subject to correction and revision by an inspector as at present.

1337. The Chairman.—Do you mean that remark to apply to the whole catchment area of the main great rivers or to the tributaries?—With such a river as the Shannon I would not apply it to the whole area, but I know the Barrow very well, and I think it would be better to take such a river as the Barrow, the whole of it under one board.

1338. And all its tributaries?—And all its tributaries; and let them be separated by sub-boards for the different districts, but all under one board.

1339. With one chief surveyor for the whole district?—That is what I mean, and one board.

1340. One board and one surveyor with assistants in the various sub-districts?—Yes.

1341. The catchment basin of the Barrow is 407,000 acres?—Yes.

1342. So that you would have one board for the whole of that?—I would.

1343. Mr. Barry.—Tell us why you would not apply that rule to the Shannon?—Because there are some very big rivers that extend 20 to 25 miles on each side of the Shannon, and it would be out of the power of any central board to exercise any beneficial influence over it.

1344. The Chairman.—You would divide the Shannon into several districts, giving each Board separate districts, but over an extensive area?—Yes.

1345. Mr. Barry.—What would you do to the main stream of the Shannon? would you put that under the authority of the Board?—Certainly not. Probably the upper part might be a separate Board from the lower part, but there is no doubt one Board must take charge of it from Athlone to Limerick.

1346. Mr. Pies.—Then you might have one Board below Athlone and one above?—Yes.

1347. And separate Boards for the tributaries, such as the Suak?—For the big tributaries, such as the Suak, the Lmy, and the Broom, and other tributaries like them.

1348. Mr. Barry.—At present the River Shannon is under the jurisdiction of the Board of Works?—It is.

1349. Have you any reason to suppose that the Board of Works does its duty less well to the Shannon than a Drainage Board would do?—Well, I have not. If the Board of Works had adequate powers I think they would be probably the best Board that could take charge of the works, but they have been cramped entirely. Two of the most able men in the Empire examined the Shannon and reported upon it—that is, Mr. Babson and Mr. Rendelmore. Whatever influence was able to do it, they disregarded the recommendation of those two men, the most thoroughly competent probably in the world, and they have adopted a diminished scheme for dealing with the Shannon which is really throwing the money away. The Board of Works cannot help that. You were over the Shannon, I think, yourselves, and it will be obvious to you that the works that have been executed are totally inadequate to relieve the district of floods, and I do not know that they should ever have been done.

1350. I dare say you are aware that questions have arisen between the people who have the jurisdiction over the Suak and those who have the jurisdiction over the Shannon as to certain impoundments at the mouth of the River Suak?—I heard something about it, but I do not know anything directly about it. I was under the impression that between Ballinacree and the Shannon there were one or two mills (it is a very flat district there), and I cannot see any reason why they should not be removed.

1351. Assuming that that is the case, does it occur to you that there ought to be some mode of touch be-

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between the Board having jurisdiction over a river such as the Sock and the Board having jurisdiction over the river Shannon?—I think there should be even more than that. I think there should be some other authority to act as an umpire, and to make them deal fairly with one another.

1352. Mr. Abernethy.—One controlling authority over all?—Yes; and I think it should be the Board of Works or some analogous organization.

1353. Mr. Barry.—Does it seem to you that if the jurisdiction over the River Shannon remains with the Board of Works there ought to be some connection between that body and the other bodies having jurisdiction over the rivers that enter the Shannon?—Well, if it remained anything like analogous to the present arrangement, the Board of Works have a great deal of control over the bodies who have charge of the different districts. They lend them the money, and the money is only advanced in accordance with the Board's officers' reports; and I think they would be quite sufficient if they had themselves adequate authority to drain the Shannon as it ought to be—there would be no difficulty, I am certain, between the authorities that would be over the tributaries and them. They would not be like a Board of Proprietors appointed for the main river, because they have no interest whatever but to do the public good service. On the contrary, there might be an endeavour on the part of the others to curtail the expenditure and curtail the works and things of that sort.

1354. Then I should gather from that, that your opinion would be rather in favour of the Board of Works retaining the control over the main channel of the river Shannon, but with enlarged powers?—With enlarged powers, that would be my opinion.

1355. The Chairman.—Powers in fact over the local boards?—They have that at present.

1356. Mr. Barry.—You mean powers of raising money for expenditure?—Yes.

1357. The Chairman.—Have they any power of refusal so as to say what shall or shall not be done?—To a great extent they have. I do not think they have absolute power, but it is they that lend them the money, and the money is advanced for the execution of the works from time to time, under the reports of the board's officers; and I think with this they have sufficient to induce them to do anything that was requisite.

1358. Then with that answer one naturally asks, why are there so many complaints that the works are insufficient on the Shannon?—For the reason that the board themselves had no adequate funds to enable them to drain the Shannon as it ought to be.

1359. Mr. Abernethy.—And that was the reason why the recommendations of Mr. Bateman and Mr. Boardman were not carried out—financial reasons?—Financial reasons only.

1360. Mr. Barry.—I dare say you are aware that the Board of Works would have carried out the whole of Mr. Bateman's report, under an Act of Parliament, if the landowners had been able to see their way to contribute £150,000?—I believe so.

1361. Would you suggest that the Board of Works, as guardians of this very large river the Shannon, should have carried out the works without any contribution from landowners?—I think so, and I will tell you the reason, the Shannon was taken in hand under a Commission that you may very reasonably call the Government itself. That Commission took the whole control without any interference with them and they left the Shannon in the state that it was at the time when Mr. Bateman made his report. And really it seems to me wholly unreasonable that the riparian owners should be charged over again for the improvement of the river after it was executed by Government officers, without any control at all of theirs and without possible interference.

1362. Mr. Abernethy.—But we have some evidence to the effect that the recommendations of that Commission—it was an Imperial Commission, composed

of only three Commissioners—that the works recommended by them were not fully carried out?—Well, that the owners or the general public here know nothing about.

1363. Particularly on the question of weirs and the provisions for discharging floods—the recommendations of the Imperial Commission, I will call it, of 1834, or further back—were not carried out in their entirety?—But who was to prevent them?

1364. I want to know how the fact occurred?—Neither the public in that district know, and certainly I do not know anything of such an occurrence as you mention. They had the sole control and no interference could be possible by the owners or by the people living in the district.

1365. Mr. Barry.—It has been stated in evidence before us that if Mr. Bateman's suggested works had been completely carried out, some 21,500 acres, which are now flooded, would have been relieved from floods?—Completely relieved. I believe that.

1366. Is it your suggestion that that improvement of lands should take place, without any contribution from the landowners?—Oh, no; I would not do that. I think whatever benefit can be shown to have been derived to the lands, it would be a very fair thing to charge them for.

1367. And you would suggest that the Government should pay the balance whatever it might be?—That is my notion.

1368. Mr. Pim.—Was not the original change in relation to the Shannon that was put upon the lands of the neighbourhood more for navigation than for drainage?—I cannot say it was more; the notion was to maintain the efficiency of the navigation and drain the lands at the same time.

1369. Mr. Abernethy.—It was with the double object of drainage and navigation?—Yes.

1370. The Chairman.—Can you speak as to the benefit or otherwise, that the navigation of the Shannon has been to the district?—Well, it has been a benefit, but not to a very great extent; but still it is a navigation that could not be closed with any propriety, especially from the Shannon Harbour down to Limerick. There is a considerable traffic upon that still.

1371. Then No. 9. "It has been suggested that the Government should take the initiative, or give special help in the formation of drainage districts"?—Well, I cannot form any adequate notion as to the way in which they should interfere; but some central or general body would be absolutely necessary to have to assist in the investigation necessary in order to form drainage districts. The mind of the flooded lands and the proper profile of the rivers, and that would never be adequately prepared without some central authority.

1372. That would be a Board independent of or in addition to the Board of Works?—In addition as you say.

1373. Perhaps it might be a separate department of the Board of Works?—A separate department of the Board of Works. I cannot see that it ever can be done rationally otherwise.

1374. Mr. Abernethy.—You think what is required is a thorough investigation of the general condition of the river from its embouchure to its source?—Certainly.

1375. And that that can only be done at considerable expense in preparing the necessary reports and designs, and that the Government should assist in that case?—I think so.

1376. And you would refer to that Board, not only questions of drainage, but questions of navigation, which so materially depend one upon the other?—Certainly. The Shannon and the Barrow are the only two that I am aware of. I do not know the Lams, myself at all, but the Shannon and the Barrow affect the navigation as much as the drainage, and it should be under the same Board.

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1377. Mr. Barry.—But you limit the amount of help that the Government should give, in cases other than the Shannon, to merely helping in the investigation?—I would not limit it to the Shannon and to the other large rivers; I think that it should be general. I think in each county there should be some investigation made of the present state of things.

1378. I mean would you limit the amount of help that the Government should give merely to assisting in the preliminary investigation, or would you suggest that the Government should help financially afterwards?—I would like to see the Government or some controlling power over the investigation, and that cannot be done without giving assistance. I think if judiciously done, it could be so arranged that it would ensure an adequate examination and an adequate preparation of designs and reports.

1379. Mr. Abernethy.—And probably an adequate result?—An adequate result.

1380. Mr. Barry.—My question was as to help after the investigation has taken place?—I think that ought to be an object to be considered too; for there are a great many of them that will never be done unless there is some subsidy or some additional grant by the Government.

1381. Would you consider the River Barrow a case in point?—I would. I think at the present time the Barrow could never be adequately drained or adequately regulated for anything less than what they have estimated, and that would be entirely out of the power of the owners benefited to repay.

1382. The Chairman.—But there are three or four estimates. What amount do you take?—£500,000.

1383. You think it would take £500,000 effectually to drain the Barrow district?—I am sure it would. I made a preliminary report on the Barrow, and examined it from beginning to end myself more than twenty years ago, and I know the river very well, and I would not at all suggest anything under £500,000 for the execution of the works.

1384. Would the land reclaimed pay for any such expenditure?—Oh, no; it would not.

1385. Then why should you spend money that would be practically a considerable portion of it—thrown away if the land recovered would not be of the value of the money expended?—Well, it is a great nuisance in the country, and in that case I think it is one of those things that would come fairly under the consideration of the surrounding districts, and they should contribute towards it, and the Government also.

1386. From your knowledge of the district of the Barrow, have you considered, from a sanitary point of view, whether the health of the people is much deteriorated in consequence of its present condition?—That is my opinion.

1387. Consequently it is a national benefit to improve it?—I would look upon it as a national work.

1388. Mr. Barry.—In your investigation about Barrow, to which you have just alluded, was your proposal similar to Mr. Manning's proposal?—Similar to it.

1389. Deepening the river?—Deepening the river so as to discharge the maximum floods and keep the average level of the water four feet below the adjoining lowlands.

1390. Mr. Abernethy.—Have you ever considered the question of embanking the Barrow?—Oh, yes; that is embanking the low places and sending the floods down between embankments?

1391. Yes?—I have considered that, and would not recommend it at all.

1392. Why?—I will tell you. There is such a quantity of water supplied to the Barrow from each side—I suppose you are alluding to between Monasteran and Athy.

1393. Mr. Barry.—I would rather take it up at Monasteran?—Embanking the river there would be wholly out of the question—above Monasteran.

1394. Mr. Abernethy.—Do you mean forming em-

bankments just upon the margin of the river when you speak of embanking the river?—I never contemplated it at all. I repudiated it whenever it was suggested.

1395. But was that what you understood by it?—Yes.

1396. But you never contemplated forming the embankments some distance back from the edge of the river, and sacrificing some portion of the land for the time being as regards floods?—I did not.

1397. The Chairman.—Would that modify your view?—No; it would not.

1398. Why?—Because there are three or four very large tributaries that would have to be drained behind the embankments—there would be no fall into them. There is the Cashla river, the Pigle river, and the Páipistown river; they would all have to be provided for by drainings and discharged into a place low enough, and that discharge could not be effected except below Monasteran and castings through the dam of Leed Daghada.

1399. Mr. Abernethy.—Do you not think it physically possible to embank these rivers also in the way I have suggested without allowing them to interfere with the drainings of the main river?—It would not be physically impossible, but it would not be beneficial to the land. Then behind them there are large plots of land each side of the course of these rivers, which, of course, would require to be drained also, and they could not be drained without an adequate outfall.

1400. But if you prevent the flood from flowing over the land by embanking all that is required, there is a very moderate amount of drainage of that land—It is always available for pasture. We have hundreds and thousands of acres in England and on the Continent done in that way effectively, and used as pasture lands?—Well, my opinion is entirely against it.

1401. Do you know the Blackwater river at all, flowing into Lough Neagh?—No, I do not.

1402. The Chairman.—Have you ever visited the low-lying districts of the Fen country in England, where the embankment system is carried out very largely?—No, I have not; but we have one in North Kerry—the Peale—that is what is sometimes called the Cashen district, it is embanked for six or seven miles. Well it is a very unsatisfactory thing.

1403. Mr. Pies.—What goes wrong?—The land at the back of it is continually soaked with wet.

1404. Is there a drain running parallel at the back of the embankment for the drainings of this land?—There is, but there is not sufficient discharge for that drain.

1405. The fall is insufficient?—It is.

1406. Is the bank there at the margin or at some distance back from the edge of the river?—It is generally on the margin.

1407. Your objection to the embanking is not that it is insufficient in keeping the waters of the main river in bounds but that it does not give you a proper opportunity of draining the lands behind?—That is entirely the objection I have.

1408. Is not that wholly a question of the amount of fall you happen to have in that particular neighbourhood? It is, and the fall on the Barrow is wholly inadequate to such a proceeding.

1409. You do not think there is not a sufficient fall to enable you to apply that system?—Certainly not.

1410. Mr. Abernethy.—Do you not think there is a greater fall in the Barrow than some of the Lincolnshire rivers in England, where there is only a few inches in the mile?—Well the Barrow is very little over that; it is one foot three inches in the mile from Monasteran to Athy.

1411. Mr. Pies.—Would not the embanking cost very much less than the casting?—I would suppose so, I never went into the calculation, but as a general question I think it would.

1412. Mr. Barry.—Your objection therefore to the embanking would be the difficulty that you apprehend in draining the land behind the embankments?—Yes.

and in the Barrow there is another objection. I am quite certain that if the Barrow was drained in the way that was contemplated in the report lately, it would undermine the bogs which are to a very large extent each side of the upper reaches of the Barrow, and along the edges of those bogs there is a very large quantity of land gradually improved and coming into cultivation, the improvement of which would be stopped as soon as the embankments were made.

1413. These bogs would not have contributed, under any scheme we have heard of on the Barrow, to the cost of the more expensive proposal?—They would not except along the margin of the tribulation.

1414. On land that is flooded you mean?—Flooded land, and some of it injuriously affected that is not flooded, and there are green pieces that have been taken in gradually by landowners along the course of the bog. They would all come in to be changed for the drainage, but if it was to be done by embankments there would be an end to any improvements of that nature.

1415. The Chairman.—I do not think you have touched upon question 10 yet?—No.

1416. What have you written upon that?—“That the control of such Boards to extend from the sources of the rivers to their discharge into the sea, or analogous receptacles, and it would be their duty to take the precautions alluded to in this query, No. 10.” That is, that one part of the river should not be acted upon so as to injuriously affect the remainder.

1417. Then the appointment of one Board to superintend the whole of the Drainage District, would provide for the suggestion made in this question?—It would.

1418. Mr. Finn.—About the original laying out of schemes, you told us that in the county of Clare the Fergus and Quin drainages are inefficient from having been inefficiently constructed originally?—Yes.

1419. Would there be, by the improved system of authorised original plans, such as you have suggested in answer to this question 10, a means of avoiding such mistakes?—I think so.

1420. Or was it that the engineer was wrong in his views?—I mean, were those done by the Board of Works?—By the old Drainage Board.

1421. Then, in fact, they were done under the very sort of inspection that you suggest in answer to question 10—that is the Board of Works?—I do not think the individuals would be the same as under the old system.

1422. You would have better mean?—Yes. Then, with regard to the maintenance of the Arterial Drainage Works, I think I stated before that if any active stimulus is to be given by the Government to the Arterial Drainage of the country it will involve the creation of some permanent organization or department, or the extension of the powers of the Commissioners of Public Works. With regard to the maintenance, as I said before, the present statutory powers for maintaining the works are perfectly adequate, and they are punished very well for their negligence whenever they commit it. In the Quin Drainage it cost £4,000 or £5,000, which has been recharged on the district now, to repair the works. I think after one or two examples of that sort it will not occur again.

1423. Mr. Barry.—Was that a case where the Lord Lieutenant was memorialised?—Yes. I do not know whether it was the Lord Lieutenant or the Board of Works.

1424. I think it was sent to the Lord Lieutenant, and he referred it to the Board of Works, but such a memorial has to be sent by a resident in the district?—Yes, and who is injuriously affected.

1425. Is that memorial always forthcoming in cases of negligence, in your experience?—Indeed I only know but one instance in my experience.

1426. Mr. Finn.—Would you recommend any system, generally, of inspection of Drainage Works in

Ireland on the part of the Board of Works?—I would if there was a contribution of Government funds towards the execution of the works, but I think if the people themselves are charged wholly with the execution of the works it ought to be left with them to maintain them. I do not think any meddling by another body, no matter who they were, would be desirable.

1427. Then you recommend that the interference of the Board of Works should cease after the construction?—No.

1428. Unless they were called upon, I mean?—It should cease after the construction if there was no contribution towards the funds; but if there was any contribution to the funds it would give a fair and legitimate reason for surveillance afterwards. Then comes the question, “Is any improvement required in the method of enforcing the law against persons who neglect their duties of maintenance?” I do not believe there is. Then, “What are the relative advantages of large and small maintenance districts?” Well, my opinion as to the very small districts is that they are inefficient entirely from not being able to employ sufficiently intelligent people to conduct the operations, and that in the large districts it would be more likely the works would be conducted systematically and properly.

1429. The Chairman.—I think you have so fully gone into the question about extending the control of the whole river to one body that you need scarcely enlarge upon that?—Very well. Then about the navigation. There is no doubt at all in my mind that the navigations provide the most economical of all modes of transport, and are therefore of great advantage to the neighbouring towns and surrounding districts, but they do not affect directly an adjacent land distinct from the neighbouring towns and surrounding districts. That is a boroeland lying alongside of a canal is not affected to any appreciable extent beneficially more than one two or three miles from it.

1430. Have you gone into that question? you say that conveyance by navigation is so immeasurably cheaper than any other—have you any figures to substantiate that—upon what do you ground that opinion?—Well, I did not put down any figures, but I am aware that a ton of goods leaving Lincolnton for Dublin can be conveyed by canal for between one-half to two-thirds of the charges by railway.

1431. That is quite another point. Is that owing to the high charges of the railway?—I would not look upon them, as railway charges, to be very heavy.

1432. What are the charges?—By railway, for coal, 8s. 3d. a ton; for corn, 10s. a ton. By canal, for coal, 8s. a ton; for corn, 2s. a ton.

1433. How about timber and stone?—There is no stone conveyed, but timber or iron or slates.

1434. What is the distance?—180 miles by railway.

1435. Would that be the charge for coal supposing any went through?—I think so. There are no coals go the whole way.

1436. But it is upon that that you found your statement that water communication is so much cheaper than railway?—I have another instance between Tullamore and Dublin, which is about half-way by the canal, I know a good deal about the traffic on the canal from there to Dublin, and it is greatly lower than any other mode.

1437. What is the distance between Tullamore and Dublin?—Fifty-eight miles.

1438. What kind of traffic is conveyed?—Coal comes to a large extent.

1439. And what is the charge?—By railway, for coal, 8s. 3d. a ton; for grain, 7s. 3d. a ton. By canal, for coal, 4s. 6d. a ton; for grain, 6s. 3d. a ton.

1440. That is about 1d. per ton per mile?—Yes.

1441. Are you aware that in England for 130 miles, which is about the distance as you put it from Lincolnton

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to Dublin, coals are conveyed for about 6s. 6d. per ton—I am aware of it.

1443. Do you think that that is not as cheap, if not cheaper than your water carriage?—It is a great deal cheaper; but there are much larger quantities conveyed, and arrangements can be made to take that that could not be made with mixed goods traffic, such as there is from Limerick to Dublin.

1444. But take Tallamore to Dublin—sixty miles for 4s. 6d.—do you consider that a moderate charge?—It is a very moderate charge in comparison to any other way that could be adopted there. It is less than what we have to pay in the county of Clare for carting sixteen miles, where we are charged 10s. a ton, and cannot get it done for less.

1447. Mr. Barry.—Is there any considerable traffic by barge between Limerick and Dublin?—Oh, yes, considerable for Ireland. When we begin to talk about things being large and small we must do it by comparison. There is a good deal of traffic.

1448. Can you give us any notion what the amount is compared with what is carried by railway?—No, I could not.

1449. Do you consider that the freighters between Limerick and Dublin largely use the canal mode of communication as compared with the use they make of the railway?—I could not say what the proportion is, for I do not know it.

1450. The Chairman.—Then I think you have pretty nearly answered questions 1 and 2 with regard to the navigation?—Yes. Then comes the question—“How far should county or other rates contribute to the maintenance of navigation?” There occurs to me a difficulty about the counties. Certainly it would not be a suitable thing to give them any charge over the navigations. They are out of their way, and if they are called upon to contribute at all, it should be by some judicial authority charging them a proportion for the maintenance of the navigation through their own county—it would not do at all to give them

any control over a canal for instance—I mean Grand Juries or analogous bodies.

1451. Mr. Barry.—You mean the charge of maintenance over them?—Yes.

1452. Or responsibility?—Or any responsibility over them. It is a canal body alone that could be charged properly with any care or regulation of the navigation of the canal.

1453. The Chairman.—And there should be no charge on the counties or baronies on either side of the canal for the purpose of maintaining the navigation?—I do not think so.

1454. Mr. Barry.—Perhaps you are aware that is done in Ireland in certain cases, that a charge is laid on the counties for the maintenance of the navigation?—I am not aware of that.

1455. Would that be contrary to your view of what would be proper?—No; but the difficulty that occurs to my mind is that you could not give any control over a canal to a county body; it would not do to have them interfering with the canal at all. If there be a charge at all it should be left to some judicial organisation, who could investigate it, to say what they ought to pay, and that should be paid in lumpsum.

1456. The Chairman.—In other words, canals in Ireland should take the same position as canals in every other part of the world, they should be dependent upon the commerce and trade of the country and not upon the Government?—I think so—and not upon the Government or the counties.

1457. Mr. Barry.—Are there any other remarks you would like to make that are not in the paper?—I do not think there are.

1458. Mr. Pies.—As regards the Barrow, how did you come to have that river brought under your special notice?—I was employed to make an investigation when they were going to make a drainage district, and I made a preliminary survey of the whole of the Barrow.

[The Witness withdrew.]

Mr. Edward Townsend, called in and examined.

Mr. Edward  
Townsend.

1459. The Chairman.—Will you kindly describe yourself and your profession?—I am a Civil Engineer, a Member of the Institute of Civil Engineers of Ireland, and I hold the Chair of Engineering in the Queen's College, Galway.

1460. You reside at Galway?—Yes.

1461. I presume you have some remarks to make on these questions which have been sent you, and perhaps you would like to go through them seriatim. Will you take the first heading:—“Importance of Arterial Drainage to Ireland. Advantages to Land Reclaimed:—(a.) Arable, (b.) Pasture”?—I think it is one of the most important works that could be carried out, viz., the giving a road to the water in a great many districts now that are perfectly inundated for want of an outlet. I have six arterial districts under my own charge connected, more or less, with Lough Corrib, which is a very large one.

1462. Will you give the names of these districts?—There is Lough Corrib, Shrule, Turloghmore, Monivea, Lavelly and Oranhill. They are all in the County Galway, except portions of Lough Corrib and Shrule, which go slightly into Mayo, but very slightly. I have made a map in case the Commissioners would like to see it, of all the rivers in my district—a skeleton map. (The witness produced an Ordinance map, and explained the positions of the drainage districts referred to in the county of Galway.) With regard to the Monivea District, I should like to say that it is one of the tributaries to this Turloghmore Drainage. It was executed, as shown on this map by a black line, as far as Newtown. Then for a distance of six miles

there was a jump taken and nothing at all was done, and the river is in its original state, all those lands being flooded. That is from Newtown. Then a portion of about two and a half miles was executed from Monivea up to Tinquin, and then the upper portion of the district was not done.

1463. The upper portion of the district centering from Tinquin up to the source?—Yes.

1464. Mr. Pies.—Under what authority was that river dealt with?—That was done by the Board of Works under the Act of 1842. That river is in a very anomalous position, a portion in the middle being left untouched, and lands flooded.

1465. The Chairman.—Can you tell the Commissioners why that has been left untouched?—There were a good lot of works suspended after they were executed in 1848, and about that time there were relief works. I think it was for want of money probably.

1466. Mr. Pies.—Was that altogether done at the public expense, and not charged on the landowners?—No; they made an award. I think they wiped off about three-fourths of it, and charged the remainder of it to the landowners.

1467. The Chairman.—The principal works were done under the Relief Acts of 1847?—All those districts were done under the Act of 1842.

1468. But by the Relief Committee?—Yes, at that time. In all those districts which were done at that time the awards were made about 1836, and the Government wiped off about three-fourths of the first cost, and only charged the proprietors with about one-



South—from one-third to one-fourth on an average. They used the lands.

1459. Do you know what that one-fourth amounted to?—I can give it you in each case. Then there is another district called the Shrule.

1470. That comprises at Lough Corrib?—Yes; at a place called Ower, and it runs through Shrule to its source at Millburn. Then these districts coloured in blue are the districts which require drainage.

1471. Will you name them?—Two in particular—the Donmore river, and the Ballyhanna and Dalgin river, the lower portion is called the Dalgin and the upper portion the Ballyhanna. These are two very important rivers, and there is an immense quantity of land flooded. The second one is the George river, which runs into the Turfborough drainage at a place called Ballinderry, where Colonel Nolan lives, about three or four miles from the town of Tuam. The third district, which is very much in want of drainage and is in a very anomalous position, is this district of Monivea. There are two districts that run south of Galway into the bay, but not through Lough Corrib, namely, the Lavelly and the Ouanhill. One goes from the town of Athenry to Clumbidge, and the other is a small district running into the same estuary, called the Ouanhill—those two have already been mentioned.

1472. What is the name of this river?—This is the Euford river. It runs from Woodlawn into Galway Bay. I think some improvements have been made here by private proprietors at the bottom, but the upper portion requires drainage badly.

1473. Can you give us any particulars of these districts that require draining, the area, the acreage, and what you estimate as the cost of the works in each district?—The first is the portion of the Monivea that was not done originally; the total acreage would be about 2,036 acres in that district.

1474. What is the present condition of that land?—Part of it is very much flooded, particularly that part in the centre which is in a very bad condition. It is always in a bad condition.

1475. To enable us to form some idea of the extent of the flooding could you mention the annual value per acre of the 2,036 acres?—I should think it is worth about on an average £1 an Irish acre per annum.

1476. Now?—Yes, part of it is worth £2, the flooded portion is not.

1477. I am speaking of the flooded portion—the 2,000 acres?—When I mentioned the 2,036 acres, a portion of that is not actually flooded, but it is very wet, and it is not in the position of being either thoroughly drained or improved until the rivers are sunk. Other portions of it are flooded regularly every year, and I have taken the total acreage of the two together.

1478. Mr. Barry.—As improvable?—As improvable.

1479. The Chairman.—Part improvable to a limited extent, and the other portion to a large extent?—Yes.

1480. Then you would have to divide it into two portions?—Of course, that will be done in the valuation of the land, and when the assessment is being carried out subsequently.

1481. Can you tell me what is the annual value of the part that requires most improvement?—I suppose the flooded portions would not be worth more than from 10s. to 15s. an Irish acre.

1482. If they were drained what would be the increased value?—From arterial drainage merely; because there are two operations that are generally carried out for the improvement of land in the west. First, there is the material where the road is open for the water, and then there is the subsequent thorough drainage, with broken stones and tiles.

1483. Which, I suppose, is left to the landowners or squires?—It is done by the owners generally under a loan from the Board of Works. I have carried out a great deal of thorough drainage under the

Board of Works for ten years in the west of Ireland. I was acting as their inspector.

1484. To what extent would that land be improved?—By the arterial drainage, I think it would be improved to the extent, on an average, of about 5s. or 6s. a statute acre. It is a variable thing of course, according to the quality of the land.

1485. What proportion of the 2,000 acres would be so improved?—I have not gone into the details in this case, because we have not completed the plan for this district.

1486. What I want to get is, what would be the cost of the work and what would be the value of the improvements?—I have made an approximate estimate of the cost of the work. Of course it requires a great deal of levelling and surveying to make out an accurate estimate. Sections and plans and maps must be made of the whole district to get at the exact estimate, but I have made an approximate estimate at £21,054.

1487. Mr. Barry.—When you gave us 2,036 acres, were they statute acres?—Yes.

1488. Then when you give the improved value you give Irish acres?—No. The improved value is an average of 5s. to 6s. per statute acre.

1489. The Chairman.—That average would extend over the whole 2,036 acres?—Yes; some might be more and some less.

1490. You say the average will be 5s. an acre. Extending that over the 2,036 acres it practically comes out to £500 a year?—Yes.

1491. And the total expenditure would be about £21,000?—Yes. This estimate is of course only approximate.

1492. Have you anything further to say with regard to that particular district?—No, I think not, except that if it was to be carried out under the Act of 1863 it would be found practically impossible to do it; the cost per acre would be so much, unless the money was either given at a very low rate of interest, or unless part of the original cost were wiped off as in the former districts. I have mentioned before, that in all the districts I have, about 75 per cent. was wiped off by the Government, and the proprietors only charged with about one-third to one-fourth.

1493. Mr. Barry.—Was the reason for that remission that those works were relief works?—I think that it was partially, but it was before my time.

1494. The Chairman.—Perhaps you will go through the same process with the other districts that you have mentioned as requiring improvement?—The Donmore and Dalgin rivers are very imperfect. The area of the land improvable I have estimated at 4,386 acres—that is the Donmore, Dalgin, and Ballyhanna rivers. An estimate has been made by an engineer—not by me—for the proprietors. He died a year ago, but the estimate he made for the district was £49,430.

1495. In round figures £50,000?—Yes, which would be about £11 5s. per acre.

1496. What would be the average annual value per acre of that 4,386 acres?—On an average I should think the increase in value would be between 5s. and 6s.

1497. £1,000 a year—a gain of about 2 per cent.?—If it was carried out under the Act of 1863 the charge would be about 14s. 8d. an acre.

1498. It would cost 14s. 8d. to improve it, and when improved the increase of value would be worth about 11s. 4d.—No, 5s. to 6s. Subsequently it could be improved by thorough drainage to a total increase of 11s., but that is another operation altogether.

1499. Are there any other districts?—There is the Grange river that runs in near Tuam, at a place called Ballinderry, where Colonel Nolan lives.

1500. Mr. Barry.—How many acres would that be?—I have not had time, and I have not been engaged to make detailed plans of this district, but judging from the Ordnance Map—I have visited the district, and walked a good deal of it—the land reclaimed would be about 1,700 acres. It is a short district.

1501. The Chairman.—Is there any estimated cost

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of that?—No. We had no data to go on for that. There were no sections made with regard to that.

1502. Mr. Abernethy.—What is the nature of the works you propose for putting an end to floods—deepening the river?—Yes, and cutting off bends.

1503. What is the nature of the bed of the river in that district?—Principally gravel and there is a little peat in the lower portion.

1504. No rock?—I do not think there is any rock in this Grange district.

1505. Mr. Pies.—What about the other two districts?—There is rock in Moineva and there is some rock in the Duncree and Dalgin.

1506. Mr. Barry.—Limerick rock?—It is generally limestone.

1507. The Chairman.—In your estimate of the cost of these works have you taken into account the excavation of those rocks?—Yes, so far as I have made an estimate I have.

1508. In the two former cases you have not, but has due regard been had to the fact of the bed of the river being rock?—Yes, that was taken into account in the first two.

1509. Mr. Abernethy.—You have got actual quantities of the excavations required?—I have with regard to the Moineva, but not with regard to the Dalgin. Those were made by an engineer who is now dead, but the estimate was given to me by Mr. Kirwan who was one of the proprietors who employed him to make a survey and plans for the district and an estimate, and the estimate he made was practically £50,000.

1510. The Chairman.—I believe you want to make some remarks on that case of Mr. Kirwan's, do you not?—No, not particularly, except that I examined the district about three weeks ago and the two rivers, and certainly the lands were in a shocking state. The drainage is very much required. The lands are desperately flooded and in portions of the district, particularly in the Mayo portion of it, there is a great want of employment in the country and the farmers themselves are crying out for the relief and they are very anxious for the drainage.

1511. Mr. Abernethy.—What district does that estimate of £50,000 apply to?—To the Dalgin and Duncree rivers.

1512. What is the acreage of the improved lands of those two put together?—4,384. They run into the Glane river at a common point.

1513. The Chairman.—Is there any other district?—I have made no special estimate with regard to the other districts, except that I am acquainted with the country and I know that they require drainage very badly.

1514. Mr. Pies.—Would any of them, in your opinion, be profitable in themselves, because neither of these you have hitherto spoken of would pay in themselves?—I do not think at the present rate of interest that is charged under the Act of 1863, that any drainage in Ireland would be carried out at present.

1515. The Chairman.—That is upon the thirty-five years principle?—Of the twenty-two years at six and half per cent, or thirty-five years at five per cent.

1516. Thirty-five years is the term, is it not?—Yes, or twenty-two years at six and a half per cent.

1517. Mr. Pies.—It is lent at three and a half per cent. interest, and one and a half per cent. sinking fund?—They pay a constant rate every year.

1518. The Chairman.—That is five per cent. for thirty-five years, or six and a half per cent. for twenty-two years?—Yes.

1519. Take the thirty-five years. What should you suggest as to that—an extension of the time for redemption of the loan?—I think that it might be done in either of two ways. I would first divide the districts into two classes—first, those which would not cost over £5 an acre for drainage. Those possibly might be carried out by a loan from the Board of Works, if the money were granted on the same principle as the

tenants now borrow the money under Lord Ashbourne's Act, for purchasing their lands; that is to say, if they could get the money at £4 for the £104, to pay both interest and principal in forty-nine years, I think, in that case, in small districts where the cost did not exceed £5 an acre, probably the tenant would be willing to pay the cost and I think he would be fully repaid; but in the larger districts where the cost per acre would range from £8 to £10 no matter how low the rate of interest was pitched, I think it would be utterly impossible to carry out any district in Ireland, unless some special grant were made by the Government.

1520. A free grant?—Partially remitted.

1521. They would neither reduce the principal or pay interest?—In a good many large districts it would cost £8 to £10, and if that is borrowed at 6½ per cent. for twenty-two years that would be 15s. an acre. That would be merely getting a road for the water and relieving floods. Then subsequently the land would have to be thoroughly drained, which would cost £8 10s. an acre, and if you put those two together that would come to a pretty large sum on the acreage.

1522. Mr. Pies.—What rent per acre is good land worth in that neighbourhood?—Do you mean pasture lands?

1523. Such land as this would be after it was thoroughly drained?—I should think it would be worth 30s. to 35s. the Irish acre. That is the good land.

1524. That will bring you to somewhere about 35s. the statute acre?—Yes.

1525. That is about as high rent as is to be got in the neighbourhood for best land?—I think 35s. There may be some very exceptional fields where they go to £2 an Irish acre, but they are very rare. 35s. now-a-days is the highest even for grazing land, per Irish acre.

1526. What is the nature of this land that requires to be drained here?—It is bog land?—It is variable, some of it is bog, some of it is wet pasture, some of it is in wet tillage, and so on. It is of a very variable nature.

1527. Mr. Barry.—What is the object of reclaiming the land if it can only be reclaimed at that considerable cost?—The fact is that in my district there have been no schemes carried out for the last twenty years at all, the expense is so great.

1528. What would be the object in acquiring land at a cost which would not pay two per cent. upon the outlay?—It would benefit the country at large.

1529. Is there any collateral benefit which would also be attendant, besides the direct improvement of the land?—I do not know of any, except that of course it will give, perhaps, more employment, and improve the state of the country generally, and the position of the farmer. It will bring more land into cultivation, and give more employment.

1530. Mr. Pies.—When you say it would give more employment do you mean it would give employment while the money was being expended on the work, or that after the work there would be an opportunity for more employment?—Both.

1531. Mr. Barry.—Is there a deficiency of land in this country for the mass of the population?—There is in Mayo, very much so. It is full of villages.

1532. I meant in the districts to which you have been alluding?—In this, Duncree district, and Ballyhanna the holdings are very small, and the men go to England for two or three months in the year, and I think they principally live by that.

1533. See harvesting?—Yes; and for four or five months some of them.

1534. The Chairman.—Are there many going over now from Galway?—There are a great many from the Mayo district—not so many from Galway. There are a great many from Ballyhanna. They call them harvestmen.

1535. Mr. Pies.—Do you think if this land were reclaimed, even at the loss you propose, there would

be a sufficient amount of land for these people really to live upon—I do not think there would be enough in these congested districts. You alleviate the grievance in a great measure, but you would not extinguish it altogether.

1536. The Chairman.—Now will you go through these pointed questions and make what remarks you desire to make upon them. You have not touched yet on the second heading, that is, "the effect on the drainage, the increase of saleable value of land, and the subject of roads" ?—With regard to the drainage I think that is rather fanciful than anything else. I believe that Professor Tyndall has calculated that 4<sup>th</sup> would be gained by draining the whole of Ireland, but I think that is rather remote as to any direct benefit.

1537. The increase in saleable value you have given us, or we can calculate that. Would the drainage improve the communication between various parts of the country ?—Well, it would improve bog roads very much.

1538. Mr. Finn.—Are there any roads in these particular neighbourhoods that are now flooded at times so as to be impossible ?—There are a great many bogs where people go across at great inconvenience—stepping stones and that sort of thing.

1539. That is rather for want of bridges ?—Yes.

1540. The Chairman.—Will you now take No. 2. Are there any works in hand resembling to be carried out ?—No, except what I have brought before you as to the districts still to be executed.

1541. What you have brought before us are districts that are not yet touched ?—Yes.

1542. Is there any work in hand requiring completion ?—No, there is no work in hand at all at present.

1543. Then No. 3, I think you have also touched upon, "as to how far advantage has been taken of the facilities for promoting arterial drainage afforded by the Acts of 1843 and 1863" ?—Of course in 1863 the 1843 Act became obsolete, and no works have been carried out under the 1863 Act in my district.

1544. Mr. Finn.—Have there been any works carried out in your district ?—Some works have been carried out privately by private owners under the Board of Works, and rivers deepened, but nothing to a large extent.

1545. The Chairman.—Not by Drainage Boards ?—None by Drainage Boards.

1546. Mr. Finn.—Can you tell us any works carried out in your neighbourhood under those Acts that have been profitable in themselves—where the increased value of the land has been equal to the interest on the outlay ?—Do you mean the total cost or on what was charged ?

1547. The total cost ?—I think not.

1548. All the drainage works you are aware of in the county Galway have been partly made by public grant ?—Yes, five out of those six.

1549. Mr. Abernethy.—To the extent of three-fourths ?—Three-fourths on an average.

1550. The Chairman.—Then I think we need not trouble you with the next heading—"What causes have prevented a more complete adoption of these Acts" ? It is a fact that they would not pay ?—No, it was too expensive.

1551. And consequently no change in the law is needed ?—Well, the change in the law that I think would be required would be as I say in small districts. I think they could be done if the money were given at a low rate of interest such as the tenants can borrow at now under Lord Ashbourne's Act for the purchase of their holdings—that is where the principal and interest can be paid off at £4 per annum. That is in small districts where the cost would not exceed £5 per acre, but in larger districts I think it would be hopeless to carry out any works under a Drainage Board unless some special help were given by the Government.

1552. What you suggest should be carried out are all so small that the existing law enabling proprietors to borrow money from the Board of Works is amply

sufficient to carry out those works ?—The existing proprietors will not spend a farthing—they have no interest. The landlords will never spend a farthing as they have no interest in these lands now. The lands are practically in the possession of the tenants. The landlord is merely a mortgagee and would derive no benefit whatever. I am talking of the case where the ground is occupied by tenants altogether and where the landlord has not any land in his own hands.

1553. Instead of calling it the headwaters borrowing the money, say the occupiers, because the Board of Works will lend to the tenant on proper security as well as to the landlord. Then these small drainage works can be carried out under the existing law by the occupiers ?—No. You refer, I presume, to the loans that are obtained by tenants now for improving their farms by thorough drainage ?

1554. Yes ?—I think not, because those works are excessively small. They are on an average about £30 or £60 per tenant, and are got by individual tenants. In the case of a district, you require a Board which would, of course, include a very large number.

1555. And that you tell us would not pay, because the cost would be so large that neither the occupier nor the owner could afford to borrow money upon the terms on which it is lent by the Board of Works ?—I am sure the owners would not borrow a farthing because they would get nothing out of it, but the occupiers would.

1556. Mr. Barry.—I gather from you that if the terms of Lord Ashbourne's Act were applied to small drainages and treated as tenants' improvements then it would be possible, provided the cost did not exceed 25 an acre ?—I think so.

1557. But that cannot be done under the existing state of the law ?—I think not, because I do not think there is power to form boards.

1558. With regard to the sixth heading I gather this, that you would charge direct on the occupier ?—I think so. I do not think that the owners would get any benefit from it.

1559. What should you say as to the question of the Drainage Board being elected by the occupiers either wholly or in part ?—In part, I should suggest. Of course the landlord not being a direct contributor could not well claim a seat on the board—he is not a taxpayer. I do not think it would be wise to give the whole management of the district into the hands of men of the occupier class, who perhaps would be deficient in intelligence. I would give them the principal representation, but I think it would be advisable to have the Government, that is the Board of Works, represented on that board. They would be materially interested, because they would advance the money, and I think the Board of Works or the Government ought to nominate a certain number on that board.

1560. In the case of occupiers being elected, would you propose any qualification in value of their holdings ?—I have not considered that point. I suppose there should be some limit.

1561. Have you considered what that should fairly be taken at ?—I have not considered the lowest limit that should entitle a man to sit. There is a scheme laid down in the Act of 1863 for proprietors, but that would have to be very much reduced for tenants.

1562. Mr. Abernethy.—Can you give us what has been expended under the Act of 1843, or works carried out in all these districts in Galway ?—Yes; the Lough Corrib district cost £116,717—the total cost. A portion of that was put on the county for bridges and public roads amounting to £2,511, which left a balance of £114,206. The amount charged in the district was £38,000, which was about one-fourth, and there was £86,206 wiped off.

1563. Wiped off by whom ?—By the Government—remitted.

1564. A free grant ?—Yes.

1565. The Chairman.—Do you recommend that expenditure of money should go on upon those terms ?—It might not be necessary to such a degree. Certainly

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if the works are to be carried out at all, some help will have to be given.

1566. Mr. Abernethy.—What total acreage was affected by the expenditure of these works as regards drainage?—It was 15,685 acres.

1567. That would be at the rate of about 5s. per acre beyond the original value?—They charged 2s. 5d. If they had charged the whole it would have been about 1s. 11d. per acre.

1568. Beyond the original value?—Yes, the improved value. If the whole had been charged it would have been about 3s. 11d., but the charge actually made has been 2s. 5d. an acre, namely, on £28,060. With regard to the Tulloughmore drainage the total cost was £69,718. A portion of that was put on the county, amounting to £1,125, which left a balance of £68,593. The amount charged on the land was £28,060.

1569. The rest was remitted?—Yes; the balance was remitted.

1570. The Chairman.—I presume you have read these pointed questions through?—Yes, very carefully.

1571. Without going through them verbatim I would put this general question to you. Have you any remarks to make upon any portion of the paper which you think it desirable the Commissioners should hear?—With regard to the seventh heading, I think the charge should be altogether on the occupier, and with regard to the constitution of the board, I think it should be principally formed by the occupiers, but the Board of Works should be represented by a certain number. With regard to the areas of contribution, I am of opinion, unless there is something very peculiar, that only the lands directly benefited should be charged. I think there would be a very strong feeling against extending the area of taxation either to the rain basin or beyond the lands actually improved. With regard to towns, if they were directly benefited in any way—for instance, if there were facilities given for sanitary purposes, for drainage, for running sewage into a river after being deodorized or on any lands in the immediate vicinity of the towns—if there were any benefit of that kind derived from the execution of the works, I think the town ought to be charged, but not otherwise. Then with regard to No. 9, I think it would be very difficult to get the tenants to take the initiative. In fact the tenants would not do it, and would not contribute towards the preliminary expenses of forming a district, and I think the initiative should be taken by the Board of Works in a measure. Of course I think it would be well that the people who are to pay should have some voice in the selection of the engineer. They would naturally have a little more confidence in him than if appointed altogether by the Board of Works, but I think any engineer appointed by those occupiers should have the approval of the Board of Works. Then if it can be shown that the district is one that can be carried out—and that can be very easily done by inspecting it—I think the Board of Works should advance the cost of the preliminary surveys and sections. Otherwise the districts will not be formed. The tenants would never pay.

1572. Now in that case would the tenants ever suggest to the Government that they should take the initiative in forming a district board?—They would, I think, do that. At the same time they would like to have a voice in the matter. Of course any money then advanced would have to be charged on the district.

1573. Then have you anything to say with regard to No. 10?—I do not consider that the districts that are formed have done injury to lower portions of the rivers where no works were executed. I believe there is some division of opinion about it, but I do not believe they do generally.

1574. Mr. Barry.—Some of the proposals which you alluded to at the beginning of your evidence were for improving the upper parts of rivers and not touching the lower parts, which have perhaps been

already improved?—I would not restrict it to those.

1575. I should like to put this case to you. Supposing it caused more water to come with greater rapidity into the lower districts, would it be your opinion that the upper districts should be at the expense of any works on the lower district to remedy that state of things?—I do not think the water would come more rapidly. The effect of carrying out thorough drainage in an upper portion of a district would be to have the water brought down more gradually, and I do not believe it would flood the lower district. I frequently discussed the question with Mr. Lyman, who was formerly Engineer of the Shannon, and he told me that the experiments that were made on the Shannon have shown that since a good many tributaries were formed in the upper portions of that large river, the floods had not at all increased at the lower portions.

1576. Mr. Abernethy.—You gave us an instance of a river which was improved in the upper and lower part, but certain portions in the middle of the river course were not improved at all?—Yes, that is the Moineva.

1577. And you said that part not improved was subject to very heavy floods?—It is always subject to floods.

1578. They would be increased by the improvement in the upper portion of the river?—I do not think so.

1579. What was the object of deepening the upper portion of the river and leaving a barrier between that and the lower portion?—They intended to carry out the intermediate part; they were distributing the works.

1580. The Chairman.—Surely the not carrying it out has damaged the land more in that unfinished part?—I do not think it is damaged more than it was before. It has prevented the unfinished part from being relieved from the floods that were always coming down there; but I do not think it has suffered more from the execution of the upper district.

1581. Mr. Abernethy.—If you relieve the floods in the upper district, when it meets with an obstruction lower down, the flood in the neglected portion must be increased?—They come down more gradually. I think if the upper district has been thoroughly drained and improved, the level of the water surface will be lowered by the construction of these drains, and when the rain comes from the sky, instead of running off on the surface which was filled with water before, it has to percolate down perhaps two or three feet, which would be a very slow and gradual process, before it gets into the drains.

1582. It all increases the volume of the river above the portion that has not been operated upon?—No. I think the quantity of water coming down in both cases would be practically the same. It might be a little more, because perhaps the evaporation might be less, but the process would be more gradual, and that opinion was also held by Mr. Forey.

1583. Mr. Barry.—You mean that owing to the land being drained to a lower level, the receptacle for the water that falls from the sky is increased?—It has to percolate down before it gets into the drains two or three feet.

1584. Mr. Abernethy.—You speak of lands where the water lay on the surface before these drains were made. That water, of course, would find its way more slowly down the river than when the drains were made?—I do not think so. If you take the water on a level with the surface a few obstacles prevent its going off. Directly it rises to the level of the obstacles, the whole of the water would run off with a rush; in the other case it goes off gradually through all the drains, after having percolated down through the ground. You have reduced the water level three or four feet by the effect of the drainage.

1585. Mr. Finn.—But at the beginning of a wet storm, if the ground was dry in consequence of a

this drainage having been carried out, what you say might, perhaps, be correct; but once the ground becomes saturated up above, would not then the water come down more rapidly by having easier means of coming down?—Yes, if the rain continued sufficiently long for the point of saturation to be reached, but this seldom occurs.

1586. And will not it come down all the faster on the land down below than before?—That is where works have not been carried out.

1587. I am speaking of where works have been carried out. You say that what delays the water coming down is that the improvement of the drainage has actually dried the land up above, and is, therefore, capable of receiving a greater quantity of water from the sky without beginning to pour it out, but that process comes to an end as soon as it is saturated?—But that takes a long time to saturate at where there is an outlet at the bottom. The outlet at the bottom is always going on.

1588. The Chairman.—Will you take the next heading now?—With regard to maintenance I think that it would be necessary to have more supervision. Some of the districts have been neglected very much.

1589. On the part of the central or superior Board?—Yes; some of them do not take an interest in the thing, and it is very hard to get them into motion.

1590. You would give them compulsory power?—I think the Board of Works or some central board should have either an annual inspection or report from the engineer of the district that the works were maintained every year.

1591. He must have power to enforce maintenance, must he not?—Yes; that power exists at present in a different way. By the Act of 1869 any proprietor has power, in case the trustees do not carry out the maintenance of any district, to apply to the Board of Works to compel them to do so.

1592. That is the proprietors. Supposing they are all unripe, and the works are neglected, could there not be power given to this central authority to compel the necessary works for maintenance to be carried out?—Certainly.

1593. That power does not exist at the present time?—Only in the way I have mentioned.

1594. But the Board of Works must be put in motion by somebody else?—Yes, they must; but I think the Board ought to take the initiative. It would be absolutely necessary in the future, if the tenants are to constitute the drainage trustees.

1595. Mr. Pies.—Do not you think that if the tenants were themselves paying the charge for maintenance, and the charge for construction, and the works were being neglected they would begin complaining to the Board of Works that the Engineer or the Local Board were neglecting their duty?—The maintenance would be paid by the tenants themselves.

1596. It is not paid by the tenants now?—It is paid by the proprietors.

1597. Supposing that it was paid direct by the tenants, and that the works were not being properly taken care of, would not the tenants then begin to

complain very soon?—They would be tempted by not having to contribute.

1598. Of course if the money is not spent it is not charged?—Yes; the money must first be voted by those very men themselves, and they would be rather slow to vote it.

1599. The Chairman.—They prefer neglecting the works for the sake of keeping money in their pockets?—There would be that danger.

1600. In your district I suppose you have not much to say upon navigation. Those drainage rivers are not navigable rivers?—I do not think the question of navigation affects us much in my district. There is some small navigation on the Lough Corrib, but it is very trifling.

1601. Mr. Pies.—It is not involved in the drainage question in any way?—No, they are quite separate; works for navigation were carried out at the same time as works for drainage, and also for the preservation of the mill power. In fact there are three Boards at present.

1602. Practically you have nothing to remark on the last head of the question—Navigation?—No; I do not think it concerns us much.

1603. Mr. Barry.—Are the waters of Lough Corrib kept at a sufficiently low level to allow of the rivers draining into it easily?—They are, except it is on the margin of the lake. There is a pretty fair fall for the tributaries.

1604. Are there any moveable sluices that discharge the water?—Yes; we have two large sluices and one large weir with falling boards. The river has to be kept up in summer for the benefit of the navigation, and also for the mill power. There are three bodies there interested in the water.

1605. Which river is that?—The Corrib River. Their interests are antagonistic.

1606. Mr. Pies.—Does the drainage suffer at present from the lake being kept up too high?—I do not think it does. The neck from the Corrib into the sea is not sufficient to discharge the enormous quantity of water that comes down from the catchment basin, which is about 1,311 square miles, with all these tributaries I showed you running into it. I believe if you take away all the water still there would be flooding along the margin of the lake. I do not think the natural outlet there is sufficient. Of course the sluices relieve it in a measure.

1607. Is there sufficient fall into the lake for these drainage works you have spoken of that have been made, or are in contemplation?—With the exception of one I think there is—that is the Cregg River.

1608. Mr. Barry.—What is the variation in height of Lough Corrib between extreme flood and summer level?—Two-and-a-half feet. It is influenced by the wind in different places, but the average is two-and-a-half feet.

1609. The Chairman.—That exhausts the questions. Have you any other remarks you desire to make?—No.

The witness withdrew.

Adjourned for a short time.

Mr. Thomas Ballin called in and examined.

1610. The Chairman.—You have had this paper before you, and probably you have read it through?—Yes.

1611. There are one or two points to which I believe you specially wish to call the attention of the Commissioners?—I think this is very comprehensive, and I shall be very glad to follow you in your own order.

1612. I believe you have been a Land Commissioner?—I have been for the last five years an Assistant Land Commissioner, and previous to that I was Chief Inspector of Agricultural Schools.

1613. Then I will ask you to follow out this paper, as I have no doubt you have made your own remarks upon the various points raised in it. Perhaps you will take first—"Importance of Arterial Drainage in Ireland"—"Advantages to land reclaimed"—"(a), sabbles"; "(b), pasture"—There can be no manner of doubt as to the importance of arterial drainage. There can be no general development of improved farming at all without it. In fact I look upon it as the basis of any departure that may be made in the improved cultivation of the land.

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1614. Do those remarks apply specially to any particular district?—It so happens, that I know all districts in Ireland, and it applies to most of them.

1615. In what way would you describe the advantages under the two first heads—"arable," and "pasture"?—The advantages are common to both. In fact we have a great deal of land in Ireland now in pasture that was arable land formerly and possibly may be again, so that I think it applies equally well to arable as to pasture land.

1616. Mr. Barry.—We have had it given in evidence that the winter floods are an advantage to the alluvial lands by the side of the rivers. Can you give us any opinion upon that subject?—I think it maintains them—that is the regular flooding of the lands, when it is allowed to act, as it does to a small extent, like the warp land in England.

1617. On the other hand it is said that the winter floods perpetuate the growth of aquatic grasses, and stop the improvement in the quality of the grasses?—No doubt that also happens.

1618. What would be your view of the relative advantages of the two?—That depends entirely on the district. In some places I should think that the mowing is very important indeed, especially on the deeper and better lands.

1619. We had our attention called to the alluvial lands on the Shannon?—I know those very well.

1620. Can you give us any opinion upon that subject—upon which side the advantage lies?—I should think it lies, in the deep rich lands, in favour of the flooding. On the medium lands, which could be improved by the ordinary drainage, if the arterial drainage had been effected, I think it would be the other way.

1621. Is it possible to localise the different descriptions of land into districts, or are they intermingled in such a way that there is no possibility of distinguishing between them?—Do you mean by getting the watersheds and things of that kind?

1622. No; you said one description of land would be benefited and the other would not?—I do not think you could draw any sharp line.

1623. I mean on the Shannon?—Well, with regard to these alluvial lands near Limerick, I should say they are decidedly benefited by the flooding, but on the other hand, with regard to the poorer lands of the Upper Shannon, where there is not the same depth of soil, there is not the same advantage to be derived from the flooding.

1624. What should you say as to the land between Lough Derg and Meelick?—I should say there are many of these lands in which what would be true of the better class of lands would not be true of the other. You have two classes of land there. Generally speaking in that entire district to remove the excess of water would be an advantage.

1625. In the entire district above Lough Derg?—I think so.

1626. Mr. Almon.—When you speak of the beneficial effect of mowing the land by floods is that a general observation?—Yes, with regard to this deep alluvial land near Limerick, for instance.

1627. There is no doubt the dirt is held in solution by the water, whether it has a fertilizing quality or not?—Rivers that run such a long course as the Shannon, and receive the drainage of such a variety of soils, there is no doubt about their having a strong mineral action.

1628. You confine your observation with regard to that to the Shannon?—Yes; Mr. Barry's question referred to that part of the Shannon.

1629. Mr. Barry.—Then speaking generally you would say some lands are benefited by winter floods and some are not?—Yes; but perhaps what is in your mind is this—that the area of land benefited by the floods is comparatively small.

1630. The *Casibona*.—Is there not also this dis-

advantage—that if you leave them open to the winter floods they are liable to the floods of July, when the crops are carried away?—No doubt they are.

1631. And does not the disadvantage of the latter far overbalance the advantages of the former?—I think that a farmer who takes time by the forelock, and who sows his hay when he ought, the disadvantages you refer to would not be as great as possibly you may think. It is a short season of flooding in some of these places in the summer season.

1632. But is not it a fact that farmers, as a rule, like to leave their crops growing as long as possible, and run the risk of these summer floods, and very frequently lose their entire crops by the floods?—I should hope that when the new departure takes place, if ever it does take place, good farming will be the rule and not the exception. It is now the exception to have anything like good farming.

1633. Do you anticipate that new departure quickly?—Well, I confine to you that if your mission accomplishes the object that I look forward to I think it may be the beginning of a new departure—I hope it may.

1634. Now, under the second head of this first matter?—That is, what you call the indirect advantages?

1635. Yes, the effect on the climate of the drainage of a district?—Well, having known Ireland for the last thirty years, as I have known it, without offering any opinion of a speculative character at all, I have had the clearest evidence before me from time to time that the climate of every district has been improved in Ireland, where effective drainage has been carried out. It rained and it dries, as I am sure you know better than I do, removes the excess of moisture in the air, which leads to certain diseases.

1636. Yes. We will divide it into two subjects—effect of climate upon the growth of crops—if you raise the temperature two or three degrees it has a great effect on the crops, has it not?—No doubt.

1637. And the effect of drainage is to raise the temperature?—Of course it is, especially of the soil. I myself have raised the temperature by drainage as much as three degrees.

1638. And you raised the temperature of the atmosphere as well?—No; I do not think you can do that to the same extent.

1639. Simply the temperature of the soil?—Yes.

1640. Then taking the other view of it—from the sanitary point of view?—Before you pass from the question of the climate, it is as well to bear in mind that with us in Ireland a difference of two degrees sometimes means famine or abundance.

1641. A difference of two degrees?—Rather less than that. I am quite sure I am speaking to gentlemen who have given to the scientific aspect of climate more attention than possibly I have; but such inquiry as I have made here is certainly justified me in saying that. Take the year 1879. It is very well known that the disastrous results in that year are largely ascribable to a fall in the temperature.

1642. But the lands being undrained in 1879 as they are now would imply a higher temperature in the atmosphere?—Yes, that is true. Still, speaking broadly, as we are now on the question of climate, there is no doubt if you increase the temperature of the soil by a couple of degrees, or even less, the crops will derive a very large advantage indeed.

1643. But the temperature in 1879 must have been purely atmospheric?—Yes; there is no excess drainage now than then. The temperature of the air and the temperature of the soil are totally different things, as I said before.

1644. The low temperature in 1879 was due to the temperature of the atmosphere, and not to the temperature of the soil?—Yes; of course the temperature of the atmosphere does to some extent, but not as much as is popularly supposed, as you know, influence the temperature of the soil.

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1648. Would drainage improve the sanitary condition of the districts not immediately subject to flood above the flood level?—You mean the watershed, or land immediately surrounding the land that wants drainage?

1646. Take the watershed of the district if you like.—I think it must; and medical men throughout the country have always assured me that they found it so. I certainly should expect it would.

1647. Have you paid any attention in that respect to the death rate? Yes, just in the way that I told you; but I think you had better take statistics from others on that point—they would be more reliable than any general remarks that I could make to you.

1648. Of course statistics of that kind apply to the country at large, and not to the particular districts, and it is local information alone that will give us the information we want.—The general effect of the information I have got for years past, going backwards and forwards through the country, and meeting medical men, is to the effect, as I tell you, that they find it so. I know several districts where the character of the climate has been improved by efficient drainage—unmistakably improved.

1649. And it has had a marked effect, I suppose, upon certain classes of diseases?—Yes.

1650. From your experience, can you confirm that opinion—that certain diseases are less prevalent where drainage has been carried out?—Yes, certainly; all those diseases, for instance, that are influenced by an excess of moisture.

1651. That has a bearing upon a subsequent part of the inquiry?—It has.

1652. Have you paid any attention to the increase of the rateable value of drained lands?—I have paid more attention to that generally enough, because I have been all my life connected with agriculture as a profession, if I may call it so for want of a better term. Therefore I am in a position to answer your question affirmatively, and to say that I have given a good deal of attention to that subject.

1653. Perhaps you will give us the result of your experience?—Are you speaking now of the increase of the rateable value from arterial drainage or ordinary drainage?

1654. Both.—I suppose you mix up both, because it is really impossible to separate them. The increase of the rateable value, or letting value, arising from drainage depends upon several things. I will confine myself now to two; first, the character of the arterial drainage, and how that is connected with the land that is affected by ordinary drainage. Of course you cannot effectually improve land by ordinary drainage without an efficient system of arterial drainage, and then, having effected your arterial drainage, the effect on the rateable value of ordinary drainage of land varies very much indeed; and I should say, at the outset, that I think it is a thing upon which there is a great deal of vague and unreliable information. Sometimes I have known drainage to improve the land 200 per cent; sometimes I have known drainage to do harm. On the inferior spewy land, of which we have an enormous quantity in this country, the effect is very little; the land is naturally so bad. The word "spewy" is a common Irish term—it means weak, thin, bad land. I think the application of the term is explained in this way: when the frost comes at it it spews. Whatever the origin of the word is, there is a great deal of that class of land in Ireland—very inferior land; and the benefit derived by that land from drainage is very often so small that I am afraid there is no return corresponding to the outlay. And, for fear I should forget it, I would suggest very respectfully to you now to consider the propriety of looking into that matter with the view possibly of remitting the whole or part of many of these debts and loans that are still outstanding. I am quite sure

that the lands have not been improved by drainage to the amount that is put down in those figures—for the amount of the advances.

1655. What blue-book are you referring to there?—I am referring to the last Report of the Board of Works of 1885-86; and I am informed that up to the present moment the cost of all the land drained has averaged under £7 per statute acre—say about £11 per Irish acre.

1656. Mr. Barry.—Does that include the works amounted under the Act of 1863?—It is page 9 of the Report for 1885. I will read the passage to you. You will not take me as reflecting in any way on this document, or on anybody. They are stating the facts, and I am merely repeating them. "The cash advances for these and other works during the year came to £35,010, making a total of £638,501, 5s. 1d. issued to Drainage Boards since the passing of the Act 26 and 27 Victoria." That is a matter which appears to me to be so important from many points of view, that I deem it right to draw attention to it at a very early portion of my evidence. I think both landlords and tenant farmers are now paying a charge on certain moneys advanced by the Board of Works, and that the lands were not improved at all to a corresponding degree, and if we are to get a fair start in this country—and I hope you will help to get it for us—I think there is a great deal here which must be, as I said before, wiped off, so as to start fair. "This amount, added to expenditure on similar works under the Act 5 and 6 Vict. (£2,390,615), gives a total expenditure by way of loans and grants for arterial drainage works of £3,027,114." Then the acreage I find elsewhere; and, dividing the one by the other, it appears to me to come out as I have stated.

1657. Yes; but then that does include the Act of 1842?—Yes.

1658. Mr. Pén.—Has not there been already a large amount of that remitted?—Yes; but that does not touch the point I want to put before you. You must divide the total acreage by the total outlay to get the average cost.

1659. But the whole of that has not been levied on the land?—No, but I suggest that you should look into this matter and see whether you could recommend in certain cases the wiping out of the whole or part of it. A part has been repaid and a part remitted.

1660. The Chairman.—What is the balance now left unpaid?—About half a million of money, in round figures.

1661. And that debt extends both to the good land and what you call the spewy land?—It does. I shall give further reasons as I proceed. The works executed so early as 1843 may be left out of account.

1662. Can you distinguish what portion of the £500,000 is still due upon the good land?—I have no means of making that calculation.

1663. Can you give an approximation?—I should think the bulk of it would be on land on which there was not an advantage corresponding to the outlay. I could mention several districts.

1664. Let me put this question to you: do you propose that the remission of the debt should extend to the whole £500,000, or simply to that portion of it which applies to the inferior land?—I should not think of such a thing as suggesting to you or anybody else that, if it can be proved that the whole of the drainage has been effective, and has benefited the ground corresponding to the money, there should be the remission of a penny; but I ask you to consider cases where there are lands, as I believe there are, which have not benefited by it.

1665. Can you give the Commission any approximate idea of the quantity of land upon which you would recommend the remission to be made?—I think you will see at once it is utterly impossible that

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anybody can give you accurate statistics in answer to that. I do not think they exist.

1666. Then supposing the Government were to consent to that remission, it would involve a separate inquiry and examination into every district, or, in fact, into every ownership of land throughout Ireland, would it not?—But they have an enormous staff. I actually find in the estimates for the year that the Land Improvement Department of the Board of Works costs £17,000.

1667. They are all fully employed?—I think, with all respect, that they could be employed more profitably in the way I suggest.

1668. Mr. Barry.—As your estimate of £7 per statute acre will appear upon the notes, would not it be right for you to modify that by the amount that has been already remitted?—It was not an argument as to the amount; it was only to indicate to the Commission that there are certain moneys that I think ought to be remitted.

1669. Mr. Abercromby.—Exceptional lands?—Yes; that is my argument. I wish to make it clear. It occurred to me to put the argument before you, that there are landlords and tenants now paying drainage charges which I think it would be well for the State to remit.

1670. The Chairman.—Can you suggest any ready means of distinguishing between the really improved lands and what you called the slightly or non-improved lands?—I should say that the staff of the Board of Works, if they are worth their salt, ought to be able to do it.

1671. Are they sufficiently experts in judging of the value of land?—I know a good many of them. I do not know them intimately, but I met them going backwards and forwards, and some of them are very highly paid officers.

1672. Are they well acquainted with agricultural questions?—I assume they are, because if they are not, they are really unfit for the offices that they hold.

1673. Surely they would be experts in the execution and maintenance of works such as drainage works, bridges, and roads, without being expert agriculturists?—Well, but they have twenty-seven inspectors and two assistants.

1674. I do not know what the composition of the Board of Works is by any means, but do you think that there is practically an Agricultural Department of the Board of Works?—They have a Land Improvement Department, and they take upon themselves to assess the increased letting value; and a body of gentlemen who take upon themselves to assess the proportions to be charged on the several lands for the outlays on the lands ought to do what I suggest.

1675. Mr. Pies.—Is it an official of the Board of Works who does that, or do they call in an outside valuer?—They do occasionally. I think there is no absolute rule. There are arbitrators, I see.

1676. Is the non-success of the drainage that you speak of owing to the original condition of the land being incapable of such improvement, or to a defective work?—Both. I will answer that question so that there may be no mistake as to my experience. I have been, as Assistant Commissioner, over several estates and farms in which the drainage was useless.

1677. Was that arterial drainage or ordinary drainage?—Ordinary drainage chiefly.

1678. The Chairman.—That involves putting the question a little closer. If those drainage works which had been carried out turned out so utterly useless, does not that imply that the owners of the land who proposed the works, or those who were engaged in deciding whether the works should be carried out or not, were ignorant of the nature of the land?—Well, I should be very sorry to appear before you to reflect upon any body of gentlemen. I

am sure they are doing the best they can, but the gentlemen who are at the head of the Department never see those lands.

1679. That is pretty well what I want to get at, whether they are in a position to judge themselves of the quality of the land, and whether drainage will improve it or not?—Perhaps you had better not press me further than my actual experience of going over lands and digging into them, and examining the drains for this very purpose. It surprised me how utterly worthless drains were in many cases. I do not think you should press me any further.

1680. Mr. Abercromby.—I suppose those lands were light, porous soils?—No, there was nothing in the lands that would prevent the proper drainage of the land.

1681. We have large tracts of land everywhere that do not require draining. Draining would only ruin it?—Well, that would come under one of the categories I mentioned, that there are lands, no doubt, that are rather injured by drainage than improved.

1682. Mr. Barry.—When you were alluding to drainage just now, were you alluding to arterial drainage, or to the thorough drainage?—Mainly thorough drainage.

1683. You were not alluding to arterial drainage?—No, certainly not.

1684. Well, our inquiry is confined to arterial drainage?—I think you will admit it is impossible to separate the two.

Mr. Pies.—One follows upon the other. You cannot have the thorough drainage unless you have the arterial drainage to begin with, either natural or artificial.

1685. Mr. Barry.—You see the figures given in the blue book as to the moneys spent on arterial drainage do not apply to the moneys spent upon thorough drainage—they are perfectly distinct matters.—Then am I to understand that all this inquiry does not touch the question of thorough drainage at all?

1686. It is devoted to arterial drainage.—Well, that is for you and not for me to decide.

1687. The Chairman.—The first paragraph in this paper is the "Importance of Arterial Drainage to Ireland."—But you have here the formation of Drainage Boards and a variety of topics.

1688. That is all arterial drainage.—I am in your hands.

1689. Then we will go on to Question 2. Have you anything to remark upon Question 2.—"Amount of work remaining to be carried out with advantage either to the land relieved or to the district in general?"—I am afraid, in the present state of agriculture, that it would be extremely questionable if anybody were to venture an opinion upon that, but if you asked me that question before the recent agricultural depression up to 1878, I could have told you that I thought there were at least five millions of acres in want of thorough drainage. I could not answer the question now.

1690. I do not think that would be an answer to this question—it is the amount of work remaining to be carried out with advantage; that is, work that has been arranged for and has to be carried out.—Well, I think it does, with all respect, because the land would be benefited by drainage.

1691. Assume that it covers both?—Up to the recent depression there was a good deal of land that would pay for thorough drainage that would not pay for it now, and I should be very sorry indeed to see taxpayers imposed upon by utilizing or spending money at present on drainage which possibly would never pay unless there is a turn of prices or a change in the general agriculture of the country.

1692. Mr. Barry.—Are you applying your remarks to arterial drainage?—As well as to all drainage. I submit you cannot separate them, because if land wants drainage you must begin with arterial drainage.



I should be very slow just now, unless you would see your way to recommend that it should be a free grant, to recommend general drainage. If the taxpayers of Great Britain and Ireland are so generous as to do it as a gift, by all means let them, but there are lands that would have paid for drainage before 1878 that the drainage of which would be a great improvement.

1693. May the Commission take it generally that your opinion is that there is little or no work that would now pay to be carried out?—Oh certainly not. If arterial drainage I take it you include what I see you very properly, if I may be allowed to say so, went down to see for yourselves, certain river courses the drainage of which would be a great improvement.

1694. Then certain works you consider could still be made to pay?—I do.

1695. Mr. *Adams*.—Can you indicate the locality of those works at all?—I think there is one enormous tract of ground. You went down to see the Barrow, I think?

1696. Yes.—Then it would be absurd for me to make any remark further than this, that my own experience, after going over a variety of lands on both sides of that river, is that there is a very large extent of land indeed there, that would be benefited by the deepening of that river.

1697. The *Chairman*.—That remark applies chiefly, I suppose, to the upper Barrow, above Athy?—Yes, chiefly.

1698. Mr. *Berry*.—We may take it rather as a matter of money—how much money ought to be spent on land to justify an improvement?—Do you mean per acre, or how shall I take it?

1700. Mr. *Berry*.—At per acre first.—I know lots of land that has been improved at a cost of £7 or £8 per statute acre, which are now not worth more than 7s. or 8s. an acre.

1701. Have you had your attention called to the estimate for improving the drainage of the Upper Barrow?—Yes. I read the paper.

1702. You are aware that an expenditure of about £500,000 has been advocated?—On a question of engineering of that kind I would not presume to offer any opinion at all.

1703. I was not going to ask you whether it is sufficient or in excess of the requirement, but do you consider that an expenditure of £500,000 would be justified by the improvement of the land in the Upper Barrow district?—Possibly you could tell me how many acres are covered by it?

1704. I find that it is close upon 46,000 acres, which means about £10, 11s. 3d. per acre. Are you of opinion that the improvement would be sufficient to justify such an expenditure?—That is a question that I should answer with great diffidence. In the first place I may perhaps say that there is a great deal of that land which it appears to me could be drained by surface drains and by a very cheap system of drainage.

1705. Yes, but that is ignoring the evidence we had before us, and which has been given frequently before other Commissions, that the cost will be £500,000. My question applies to that standard.—If you will kindly excuse me, I would rather leave that to you; for you have seen the lands and you have had the estimate.

1706. We wish to have evidence from people who know, and as you are practically acquainted with these agricultural questions we shall be glad of your opinion whether you think that the improvement of 46,000 acres of land would be such as to justify an expenditure of £500,000 in that improvement?—Knowing the district as I do, if the land were mine just now, I would not be a bit afraid to commence with the good lands, but I would hesitate in draining all that land beginning with an outlay of £500,000 for deepening the river alone. But in saying this, I refer only to the agricultural aspect of the question, and speak as a private individual who would expect a

satisfactory return. But, in judging a project of this kind, you will take other things into account.

1707. The *Chairman*.—Now, if you please, we will go to the third question.—“How far has advantage been taken of the facilities for promoting arterial drainage afforded respectively by first, the Act of 1843; secondly, the Act of 1863?”—You must, of course, take the Act of 1843 in connection with the series of Acts that followed it. In the report for 1867 it appears to me that you can see from the tabular return on page 6 that it has been very freely taken advantage of. First of all, when they were dealing with the Enchequer Bills they expended £390,000; then from that down to the Act of the 29th and 30th Victoria, when they got a million, there is a great deal of money expended; in fact, the total for arterial drainage is £2,117,000; then under Mr. Labouchere's Drainage Act there was £199,000, and then there is a heading, “Drainage farm buildings” etc. I think it was freely taken advantage of, and all the subsequent Acts too.

1708. Then you think both these Acts have been freely taken advantage of?—I think so. I think the evidence is pretty clear on that point.

1709. Will not it depend in a great measure upon the total quantity of land that requires drainage, because, it might be, two millions or even ten millions might be a small sum as compared with the money required to drain all the land? You can only call it a liberal advance of money if it applies to a large percentage of the area requiring improvement.—I think the evidence goes to prove—not only the figures of the Board of Works, but the evidence we have had from the proprietors in Ireland—that one has never found any unwillingness on their part to take advantage of drainage works; in fact, I am quite sure they exaggerate the advantage of drainage very often, especially on bad lands, and they have taken advantage of it in cases more than they ought. But I do not think the Act of 1863 has been availed of so freely.

1710. Mr. *Berry*.—Can you tell us how much has been spent under the Act of 1863?—There is a table on pages 6 and 7 of the Report for 1885-86.

1711. We have had it given in evidence that it is about half a million. I do not know whether you agree in that.—River drainage and navigation are mixed up; river drainage is over half a million, £636,000.

1712. That is up to a particular date. I do not think that shows under what Act, does it?—Oh yes, under the Act 26th and 27th Victoria, that is, the 1863 Act.

1713. Balance outstanding £527,000?—Yes, that is so.

1714. The *Chairman*.—You stopped short in one answer you were about to give, that you did not think the Act of 1863 had been taken advantage of; what were you going to say in completion of that sentence? Do you mean it has not been taken advantage of so much as it ought to have been?—I do. I think it was not.

1715. Why?—Well, the people have got intelligent in the meantime, and the Act absolutely put the whole thing, it appears to me, into the hands of the Board of Works, and it has practically interfered with the local body. For instance, there is a clause in the Act itself that empowers the Board of Works to appoint the first Commission. Well, if men were to be responsible for taxes, that was a mistake. If local bodies of local people are to be responsible for providing the funds, surely they ought to be consulted at the very first start. The words which have not received enough attention are in the Act of 1863, section 15, “The members of the first Drainage Board shall be named by the Commissioners.” With regard to drainage of this kind, when the State takes it up, I cannot help thinking they ought to allow some time to elapse after the execution of the works before making any

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charge, even if they were to continue the charge longer. Say they make a charge for thirty-five years, the drainage does not produce any effect for the first or second year.

1716. But is it not the fact that seven years are allowed?—Seven years is not quite enough on many lands.

1717. But seven years are recognised in the Valuation Acts as a proper period?—Yes.

1718. We have been told by a witness who has had considerable experience in these matters, that it takes from one to four years to realize all the benefit?—It depends a good deal on the land.

1719. You would say from one to seven or more years?—Yes. I will give you an instance that may interest you. The Phoenix Park was drained, and, living in Dublin as I have for many years, I was very much interested in this, and I found several years elapsed before there was any change, and it was over ten years before many of the more valuable grasses presented themselves, so that the period would vary entirely with the character of the land.

1720. But surely Phoenix Park cannot be considered an area that required arterial drainage?—Arterial drainage is the foundation of the general drainage.

1721. Because that is not flooded land.—Yes, but it will not take effect on the lands that are thorough drained. There may be no benefit at all to the lands that you charge from the arterial drainage; it is only when you come to reap the benefit of it in the effect on the lands that are thorough drained.

1722. I wish you to confine your attention to land that is improved from being protected from floods: Phoenix Park cannot be flooded.—Then pardon me for saying you are narrowing the inquiry to a point that would be perfectly useless for any practical purposes.

1723. Possibly so; but I wish to ask you, as an experienced person on agricultural questions, whether the improvement of flooded lands takes from one to four years to attain its highest state of improvement. Do you agree with an experienced witness in that?—No; my point is this, and if I have not made myself clear about it, I wish to do so—that the period should vary, at all events, from one or two to ten years, according to the land.

1724. Then you consider seven years are not sufficient?—Not in every case.

1725. Would it be on the average?—On the average it would.

1726. Mr. Pöw.—Do you say that the result of draining grass lands (we will suppose lands previously saturated, and then you thoroughly drained them) is to have a change in the character of the grass?—Certainly.

1727. And that it takes some years to produce that effect?—Yes; in many cases the roots of the old grass must die out altogether, and that takes a long time.

1728. Do you know lands in the neighbourhood of the Shannon which are flooded every winter?—I do.

1729. Some evidence has been given to us to the effect that those lands are actually improved by the floods acting as a top-dressing of the land.—That I believe.

1730. And do you consider that if those lands were relieved altogether of these summer and winter floods, and were no longer saturated, they would not be improved—in other words, do you think they are actually better circumstanced at present, subject as they are to winter floods, than if they were relieved from both summer and winter floods?—I am quite sure of this, that with good fallow lands, unless you deepen the river so as to completely relieve them of water, you will get more produce out of them as it is than by ordinary drainage.

1731. Then you mean to say you must lower the bed of the river sufficiently to enable you to thoroughly drain this land, or else it will be better as it is?—

Certainly; you must change the entire character of the herbage by thorough drainage. If you do not thoroughly drain them, you will not change the character of the herbage.

1732. You think, if the arterial drainage was carried to such a depth as to enable you to get thorough drainage, you would then get superior grass to what there is now?—Yes; you will then get some of the finest lands in Ireland,—land fit for any purpose.

1733. But you think, unless arterial drainage works were carried out to that extent, so as to permit of thorough drainage, you will not get any substantial benefit?—You certainly will not get as much of the grass as you have now; you will not change the grasses that are there now, and as long as the grasses that are there now remain, you will get more produce under the present system.

1734. More produce, but of an inferior quality.—Yes, but it is not bad hay at all if it is sward properly.

1735. The Chairman.—You made a remark just now about the appointment of the first Drainage Board in the district by the Board of Works, so as to lead the Commission to infer that they took the power out of the hands of the local people by appointing the first Board.—No, I did not add that rider to it.

1736. No, you did not; but what was the object of the remark, may I ask?—The object of the remark was, that it was in the power of the Board of Works to select perhaps not the best man,—I do not say that they would do it; I am sure they would not intentionally; they would do the best they could; but to err is human, and I think the people themselves would be the best judges of the best man.

1737. Have you read these clauses carefully?—I have.

1738. Does not it strike you that when a district is arranging for a Drainage Board, you require experienced persons, and that this first sub-section enables the Board of Works to appoint a Drainage Board who are supposed to be experienced men, for the purpose of instructing their successors, and that that Board practically goes out at the end of twelve months?—It gives them the power.

1739. And then the local people, after having had some twelve months' instruction from an experienced Board, carry on the work themselves—is not that the effect of all these sections?—The point is very clear which you put, but why, when you give local government to a district with one hand, should you curtail it with the other hand?

1740. Is not it because it is supposed that they are inexperienced in these matters?—But surely the people in a district are the best judges of who is the best farmer—better than the Board of Works.

1741. I mean that strikes me as being the object of these sub-sections.—Well, I see no reason to change my opinion.

1742. Have you any remarks to make upon Question 5?—What I think it best for a witness like myself to do is, to state facts to enable you as a Commission to form your own judgment upon that subject with the facts before you.

1743. Perhaps you will favour us with the facts that you think bear upon the question?—My reference to facts referred to what I have said and to what I have to say upon other subjects; but, as you put it to me, I may state at once that my experience has told me that there will be no development of arterial drainage or any other drainage, till the entire mode of appointing the local body, whatever it is, is altered.

1744. Mr. Barry.—In what direction would you suggest to have that change?—At present it appears to me to be very much in the power of a limited number in a district to set the dog in the manger; and in the public interest I do not think that should be permitted. I think, if the majority of the persons interested in the land agree amongst themselves, there ought to be no power of interfering with them.

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1745. Would you say a bare majority or a proportionate majority?—I do not see why you should be afraid of a bare majority of that kind. It is a question that touches the pockets of the people and their self-interest.

1746. The Chairman.—What proportion of the persons entitled to vote now have the power to constitute a board?—Under the Act of 1843, one person could form a board.

1747. But under the Act of 1863. I want to understand what you mean by that remark as to the day in the morning. The question is, what minority have now the power of preventing a scheme from being carried out?—What is in my mind is this, that the persons who are interested in the land (it should not be a question of class) ought to have power something in proportion to their interest in the land; and if you adopt that as the basis to go upon, the present system would require to be modified.

1748. Mr. Barry.—That would probably bring you to the next question, because the first thing is, who are the persons to be; the next question is, whether it is to be occupiers or owners?—Yes; that would be so. Whoever have power to call for the Board and to form the Board should be the persons to be charged.

1749. The Chairman.—At present, a drainage district can be formed if the present owners of one-half in value assent, unless the owners of one-third in value dissent?—Well, holding a public appointment, as I now do, I do not want unnecessarily to lessen my own usefulness with any class; and therefore what I should like to do would be to indicate, as far as I can, the direction it would take. Now, I do say that one-half the value could usually swamp almost the entire of the farmers in a district, and prevent altogether the formation of a Drainage Board, and as a matter of fact that has occurred in my own knowledge.

1750. I should like you to explain that, how one-half in value can swamp nearly the whole of the farmers?—One proprietor may be the owner of half the entire watershed. There may be one owner and 50 or 60 or 100 tenants.

1751. Mr. Pim.—But at present it is the owner only and not the farmer, unless he happens to be the owner, that has any power of expressing an opinion in the matter?—Well, that is what I complain of.

1752. Would you propose that the occupying farmers should be the persons who would have the power of initiating these matters?—Certainly; they should have more power than they have. I have in the public interest tried to get up Drainage Boards myself, and they were stopped by the same I am endeavoring to indicate to you.

1753. Are you speaking of cases where the farmers were willing to incur charge, but the owner stepped in and prevented it?—Yes; stepped in and played the dog in the manger.

1754. Then you propose to give the occupiers some share in the appointment?—Decidedly; and there will be no extension of drainage till you have that, or something like it. Of course you can protect the proprietor.

1755. That would you propose that the charge should be borne by the occupier direct—by the tenant?—I should not be much afraid, if the system was good,—if you had a good effective administration,—to put an adequate proportion on them, and that would be in round numbers about half and half.

1756. The Chairman.—That is not quite the question. If the occupiers are to appoint, should not the charge be borne by the occupiers?—I do not think the occupiers should have the whole of the power. I should be very sorry indeed if the owners of land, as long as they are there, should not have a voice; and I think the proper way of assessing the taxes would be in proportion to the interest of the owner and occupier in the land.

1757. Has the owner now, under judicial rents, any

advantage in any increased value of the land?—Well, if the Land Act be not a fraud, the occupier certainly has a number of years' purchase.

1758. But supposing he does not want to sell?—He is the tenant in possession for ever, subject to revision every fifteen years.

1759. But he has no interest in any improved value of the land till the fifteen years are expired?—He roams it—he pockets the money.

1760. But you mistake me—I am speaking of the owner. What advantage has the owner in any improvement of the land till the term of fifteen years has expired?—An owner of land all over the world, if a sensible man, improves his property with the view of getting an increase of rent at the proper time.

1761. Is that altered in Ireland?—No; it is not. He will get it at the end of fifteen years. I am forming my judgment not on a lease of fifteen years, because I think it is an improper thing in the present state of this country to allow the lease for fifteen years to stand against either side, and if we are to have this new departure that I look for, I think that must come in as a part of a scheme.

1762. We can only deal with things as they are now. You may recommend changes, of course; but I want to know why any proportion of the charge should be put on the owner when he reaps no benefit in any improvement of the land?—But, I repeat, he does at the end of the fifteen years. It will amount to this—if you do not put some of the charge upon him (I do not say how much it should be), and yet allow him to come into court at the end of fifteen years, you are then really endorsing that for the property of the tenant.

1763. How? Is not it left to the courts?—No; pardon me. I will finish what I was going to say on that point, and then you will understand it. If land be now worth £1 an acre, and if by arterial drainage it is worth £2 an acre at the end of the fifteen years, and in the meantime you make the tenant pay *all*, is it not plain that you do not act equitably between the two parties?

1764. If the £2 is not available before the expiration of the fifteen years, that would be true, but, inasmuch as the tenant immediately reaps the benefit of the drainage, he may reap it for twelve or fourteen years without paying any extra rent?—Well, we will suppose that he derives the full benefit of the drainage at the expiration of six, eight, or ten years, then you charge the whole outlay on the remaining time to the tenant. The result will be that, inasmuch as the land was not benefited from the start to the full extent, you may be putting rent upon him which is impossible, and after the expiration of the fifteen years the landlord will come in and derive his share of the increased value, having done nothing.

1765. You are assuming that the full value becomes the tenant's property at the expiration of a certain number of years, but is not he reaping the benefit to some extent all through till it arrives at the maximum?—He certainly does.

1766. And that maximum may be four years upon some land?—Well, I can only state my own experience. I should think that the equitable way between the parties is to make them pay in proportion to their present interest and their prospective interest.

1767. Mr. Barry.—May we take it, then, to that extent you would qualify your answer about half and half?—Certainly, because I go in for an equitable adjustment between the two parties.

1768. Mr. Pim.—Supposing the whole charge were imposed upon the tenant, and that it was he who was the person who had in the first instance a right to say whether the Drainage Works should be carried out or not, could not that improvement be registered at once as a tenant's improvement, and would not that protect him from the landlord obtaining any increase of rent at the end of the fifteen years in relation to that particular improvement?—No. There

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is one point with regard to the Land Act that appears to me to be very little understood, and therefore in answer to you I say this.—The Land Act as now administered, as far as improvements are concerned, is this, that if I take to land a piece of land worth £10 a year, and by my skill, industry, and capital I make that worth £100 a year when the rent comes to be adjusted, I should only get a percentage on my improvement; the whole of the rest goes to the landlord. I do not think that is equity.

1769. I thought there was power of registering improvements as being solely the property of the tenant?—The whole question is very much what I tell you, and I can only add to that that I believe the interpretation of the Act as it now stands has, in many places, practically killed out tenants' improvements; and that without some modification of the law such as I suggest all improvements will cease. You will find that the Board of Works themselves say that the number of applications have ceased; and they will become less and less till something is done.

1770. Yes, but at the present day tenants have no power of asking for a drainage scheme to be carried out; it rests entirely with the landowners, and we are told by other persons that the reason there are so few applications now is because of the Land Act of 1861, which has made the landlord's position quite different from what it was; and therefore he is now unwilling to incur expenditure, because he says, "I shall never get back from my tenants what will repay me."—That is quite correct as far as it goes; but it does not go the whole way.

1771. Then you seem to be of opinion that both the Drainage Act and the Land Act would require some change?—Certainly; you have hit off what I want to convey to the Commission.

1772. The Chairman.—To what extent would you

change those Acts?—Have we done with the question about the apportioning of the rent charge?

1773. I think so.—Then I will submit this general proposition to you, that with regard to any improvements made by either landlord or tenant, as long as they are effective as a factor in increasing the productive power of the soil, the man who made them should get credit for them; and it is for you to suggest how that is to be done.

1774. It does not strike me as an engineering question at all. However, instead of taking you through these questions *arbitrarily*, perhaps you will do that yourself. If you wish to make any observations upon the subsequent questions beyond No. 7 we shall be glad to hear you.—No; I shall be very happy to answer any question any of you may wish to put to me, but I have nothing particular to add.

1775. Mr. Puse.—Have you any view upon this eighth question as to the area of contribution and the question of towns in the neighbourhood being made to contribute?—I do not see why you should charge a town. If you do any works that will increase commerce, if you give facilities for opening up the town or district, then you might think of charging a town; but as long as you simply confine yourselves to thorough drainage or arterial drainage for the benefit of particular lands, the persons who are immediately benefited by the improvement are the persons who ought to be charged.

1776. Mr. Abernethy.—Supposing the effect of the arterial drainage as regards lands adjoining towns is to prevent flooding and also to prevent the flooding of roads and communications leading to them, are not those two things very direct benefits, and ought not the towns to pay for them?—Yes; I think it is very likely that such cases may arise, but I think they would be very few.

[The witness withdrew.]

Mr. James Dillon, recalled—further examined.

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The Witness.—Perhaps I may ask this one question with regard to the Act of 1863: if this Commission is of opinion that that should be revised, I have gone through the clauses to show what alterations it would be absolutely necessary to make in that Act in my opinion in order to be of any use.

1777. The Chairman.—We cannot express an opinion upon that, but we shall be much obliged if you will make any suggestions that occur to you.—I have a list on paper which I shall be happy to give you.

The same was handed in, and was as follows:—

Should Government decide merely to revise the Drainage Act of 1863, to meet the new requirements consequent upon the partial change in the ownership of land?—I am of opinion said Act would have to be altered in the following clauses: Nos. 6, 8, 9, 15, 17, 19 to 31, 33 to 38, 39, 43, 44, 47, 49, 53, 54, 57, 59, 65, 73, 75, 78, 79, 80.

#### Schedule to Act.

Annual elections objectionable.

It is impracticable to post notices outside Board-room door. Members of Drainage Board should not act as Board's officers.

Then as to Act 37 and 38 Vict. c. 72, clause 1 impracticable.

As to Act 29 and 30 Vict. c. 49, clauses 2 and 13 impossible; clause 15 unworkable; clause 18, Commissioners have failed to act in some cases.

Then as to Act 32 and 33 Vict. c. 73, it is objectionable and costly as regards assessment on proprietors and protecting counties, from cost of bridges largely used by the people of the county.

As to Act 43 and 44 Vict. c. 27, it is objectionable by threatening Drainage Boards with cost of works outside their district.

Having briefly enumerated some of the defective

clauses in the Act 26 and 27 Vict. c. 88, I would add that I believe this Act might be made more workable if the following defects in the clauses above referred to could be got rid of wholly or in part, as so to make it possible to adopt some of the following suggestions:—

Clause 6.—The preliminary documents required for lodgement under this clause are too costly, and could be much simplified by avoiding unnecessary detail, as in the case of Parliamentary plans for railway and other works. The Inspector should receive all evidence on oath, and should require the production (when necessary) of original documents and account books, so as to protect Drainage Boards from new evidence being sprung upon them after the estimates for their works have been revised by the Inspector. The proportion of assents required is too high, and unless half dissent in writing loans should be granted.

Clause 8.—Provision should be made for extending the time allowed for works without any expense to a Drainage Board, in proportion to the magnitude and cost of works.

Clause 9.—Area of taxation should be limited to taxing such areas and interests only as will derive a direct benefit, or a measurable indirect benefit, from the expenditure of a loan for drainage work.

Clause 13.—Drainage Boards should be elected for at least three years, avoiding the months of July, August, and September for election, in order to reduce legal expenses and risk of non-attendance at elections for new Board.

Clause 17.—Provision should be made against members of Drainage Boards being allowed to act as paid or honorary officers to said Board.

Clauses 19 to 31 would require to be recast, as the

present system of arbitration is too tedious and costly, and unsuited for drainage works. Unlike the damage caused by railway and other large works, the damage caused by river works, as a rule, is very slight, and the sums received are sometimes but a small fractional part of the legal expenses connected with each case. The right of traverse before a jury might be reserved for all sums over £100 (awarded by the Inspector after hearing evidence on oath).

Clause 33 to 38 are useless.

Clause 39.—This clause must be amended to harmonize with the Land Act of 1881.

Clause 45 is not workable under the Land Act of 1881.

Clause 46.—Rate of interest should be reduced in proportion to the magnitude and cost of the work, to 6, 4, and 3 per cent. per annum.

Clause 49.—Under the Act of 1881 a drainage charge could not be made on an entire demesne, for the benefit of draining a fractional part of same belonging to different owners or tenants.

Clause 53.—Costs of awards and arbitration should be reduced, as already explained.

Clauses 54, 55, 57, and 60.—Now impracticable.

Clause 65.—The protection secured to members of Drainage Boards should be extended to their officers.

Clause 73.—Drainage works should only be charged with one-third the cost of rebuilding old county road bridges.

Clause 76.—Impracticable.

Clause 78.—Private owners should not be liable for expenses.

Clause 79.—Notice should be sent to Ordnance Survey Department, to report to Lord Lieutenant in Council, etc.

Clause 80.—Power sought should be compulsory, not permissive.

Schedule to Act.—Many Drainage Boards rent no Board-room or other premises, and therefore cannot, as required by Act, post their legal notices on outer door of their Board-room, etc.

With reference to the Land Improvement and Arterial Drainage (Ireland) Bill, ordered by the House of Commons to be printed, 10th May 1885 (a Government Bill, I believe), I am of opinion the following clauses would require amendment, in order to reduce the cost of and facilitate the development of arterial drainage, should the Government decide to entrust the working of this Act to the Commissioners of Public Works, Ireland:—

#### PART I.—IMPROVEMENT OF LAND.

The whole of Part I. of this Bill would have to be revised, so as to work harmoniously with the Land Act (Ireland), 1881.

All parties (in addition to the landlord) directly benefited by the new works to be taxed in proportion to the benefits derived, particularly in cases where judicial rents under the Land Court were fixed before completion of new works.

In case of poor bad land, time for repayment of loan should be extended to thirty-five or forty years, at low rates of interest, say  $\frac{3}{4}$  or 4 per cent., on account of the poor quality of the land.

#### PART II.—ARTERIAL DRAINAGE.

Clause 17.—This clause provides for the preparation of preliminary documents far too costly, having regard to the fact that the Act of 1881 has greatly reduced the landlord's interest in land improvement when land is not in their own possession. For this reason the occupier, who has a large interest in the land, should be made to contribute towards the preliminary expenses.

Clause 18.—When lodging documents relating to a large scheme, extending through two or more counties, so much of the documents only as relates to each county should be lodged in each county office, instead of the whole of the documents in each county. If power is given to the Public Works Commissioners to revise the estimates, they should be held responsible for their insufficiency, with power to supplement the estimate.

Clause 19.—Unless owners of one-half in value of land in the proposed district dissent in writing, the works, if remunerative, should be sanctioned. One-third dissenting should not be given the power to prevent the execution of a useful work.

Clause 20.—The limit of three years for purchase of land and execution of works, or even three times that time, might (as I can prove) be quite insufficient in the case of large river works with flood inundations of less than 12 inches per mile, therefore in all such cases Drainage Boards should not be put to the expense of obtaining special Acts of Parliament for extension of time, which has happened in certain cases.

Clause 22.—To save expense, Drainage Boards should be elected for three years, and, in order to secure a proper attendance of voters, elections for new Boards should not be held in the months of July, August, September, and October. Nor should members of the Drainage Board be allowed to act as paid or honorary officers to said Board. Giving one member of a Drainage Board power to act in the absence of Drainage Board would be most objectionable.

Clause 23.—If the elections are to be the owners of land within the drainage district, but that the occupier pays the drainage charge, this would mean taxation without representation, therefore this clause will require a great change to be made in it. Yet it is essential that the new Drainage Boards should be composed of educated men, possessing a capacity for business, etc.

Clause 25.—Compulsory power should be given to enter adjacent drainage district, as in the present state of Irish permissive power might be useless.

Clause 27.—Limiting the purchase-money in certain cases to £50 would render this clause useless, as a tenant entitled to £5 could, to evade it, claim £50, 1s.

Clause 30.—Most objectionable, as it would saddle Drainage Boards with the cost of a staff of officers after execution of works.

Clause 31.—Useless, unless the loan was treated as a whole, not in part.

Clause 32.—If Treasury loans took precedence of private loans, latter could not be obtained.

Clause 33.—If No. 1 award is to be followed by an award No. 2, Act would become unworkable.

Clause 35.—In the case of tenants purchasing under Lord Ashbourne's Act, how could the supposed rent be seized for a drainage charge, or will landlords assent to drainage works if kept in doubt as to receiving tenant's rent, benefited by drainage works?

Clause 36.—Would not work in the present state of Ireland.

Clause 37.—Rates of interest on loan should vary from 5 to  $\frac{3}{4}$  per cent. per annum; the larger, more costly, and permanent the work, the greater should be the time allowed, and the smaller the rate of interest charged for the repayment of the principal sum.

Clause 39.—No option should be allowed when dealing with judicial rents—rents thus fixed are based on the value of land at the time; same is impacted by the Sub-Commissioners, and any works completed afterwards for the benefit of said land should be charged on said land.

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Clause 41.—Lands outside district, if benefited by additional works, should be charged in proportion to benefits derived.

Clause 42.—Unworkable as to entire denomination of land.

Clause 44.—Permissive power useless.

Clause 45.—It would be sufficient to elect Maintenance Boards every three years.

Clause 49.—Should occupiers and owners of land injuriously affected by neglect of Maintenance Works fail to enforce the proper execution of Maintenance Works by either the Drainage Board or the Commissioners refusing to take action, such owners or occupiers should be relieved from the partial payment of the old drainage charge, by increasing the charge on the district, refusing to maintain the works, &c.

Clause 57.—The Ordnance Survey Department, Ireland, should be required to report to the Lord Lieutenant in Council, &c.

Clause 58.—To this clause should be added the words, "or enlargement" after "obstruction."

Clause 60.—The protection to the members of the Drainage Boards should be extended to their officers (this is absolutely necessary, as five actions were brought against me personally for duties supposed to be performed by me on behalf of the Drainage Board, and by defending them I put the parties to great expense).

Clause 64.—Compulsory power should be given to alter any work injuriously affecting a proposed drainage when executed instead of permissive powers, &c.

Clause 68.—Must be revised in accordance with the Land Act (Ireland) 1881.

#### FIRST SCHEDULE.

##### *Scale of Rating, &c.*

This schedule cannot be prepared until it is determined whether the improvements effected by arterial drainage are to become the property of the owner or the occupier of the land, and in what proportion either or both are to pay the drainage charge and maintenance rates.

I would prefer not having to deal with this subject in such a detailed manner; but, having been engaged during the last twenty years in different parts of Ireland in successfully carrying out several large arterial drainage works, including nearly two hundred miles of river and tributary works, at a cost of £226,644. I am prepared with evidence relating to the several causes of failure brought about by the defects in the Acts above referred to, and that are likely to occur again unless the defects I refer to in the Acts are successfully got rid of. Especially in reference to cases where the first cost of the works under the Act of 1863 has been increased by defects in the previous Acts, and from there being no provision in the Acts to subdivide large drainage districts into workable subdivisions corresponding to the sub or natural outfalls in the river basin. So as to guard against the accumulation of interest-money being added to first cost of works, and generally as to other causes that have led to the estimates, as revised by the Government Inspectors, being exceeded. Sometimes owing to the attempt to treat the works of a large river basin as a whole, when there is evidence to prove that the same works could have been more economically executed as separate districts under the superintendence of Drainage Boards acquainted with the localities with which their interests are connected.

Then, with regard to a proposed Bill that was brought into the House of Commons and has not passed yet, I have referred to the alterations required in that; but my opinion is that neither of these Acts would be of any use in their present form. When I was last examined before you, I was going to Question No. 4.—"What causes have prevented a

more complete adoption of these Acts?" As regards the Act of 1843, the great waste with which the works had to be commenced, and the want of proper supervision, and the unskillful way in which the Drainage Commissioners carried out the works (and I know of one case I could give exact information about), this led to the public money being squandered, followed by an outcry against the Irish Drainage Commissioners in Parliament and in the country. The Act of 1863, which would have been a great success, was made unworkable by the passing of the Land Act of 1881, and by the fall in the value of land, because the landlords, with very few exceptions, now decline to make themselves personally responsible for new drainage charges where so much uncertainty exists as to their power to compel their tenants to contribute their proper proportion of the drainage charges. I could give many examples of where the tenants successfully resisted paying their proportion of the drainage charge under the Act of 1863. I do not know whether your Commission would care for information of that character.

1778. I think, if you could give one or two typical cases, it would be useful.—In the case of the Stoneford Drainage Works, the works were in progress during the passing of the Act of 1881. Prior to the passing of the Act of 1881, the tenants frequently petitioned the principal landed proprietors in the Stoneford Drainage to assist in carrying out the work, and, after many requests of that kind, the landlords assented, and made themselves personally liable for the repayment of the tax. Before the district could be brought to what is termed the final award, many of the tenants, having been in the enjoyment of the improvements effected by the drainage for several years, applied to the Land Court to reduce their rents, and the Land Court reduced their rents, particularly in a large number of cases where the farms were enormously benefited by the action of the drainage. The landlord then brought these cases to the Court of Appeal, and I was retained on the part of the landlord, the Earl of Darnley, to give evidence to try to set aside the decisions arrived at by the Sub-Commissioners, on the ground that those tenants had been paying the rents for years for the land in its unimproved condition; that they had subsequently, after the land was improved, gone to the court to get the rents reduced, although the farms were greatly benefited, and that his lordship thought it a hardship that the rents should be reduced, and that he should be put in for the whole drainage charges practically. The result was that the Court of Appeal did not feel justified in setting aside the decision arrived at by the Commissioners. None of the tenants attempted to take the full benefit of the drainage till after they got their rents reduced, although there was a certain amount of benefit from the arterial drainage directly. When I went down, as I have occasion to do from time to time to examine this Stoneford Drainage, I found many of them had made most substantial improvements, and taken the full benefit of the Drainage Works, after the rents were reduced. The result is that the Earl of Darnley, although he assisted in carrying out the work in the full belief that he would be able under the Act of 1863 to get a fair portion of the cost put on the tenants, has now, practically speaking, in the cases I have referred to, not only to pay the whole of the drainage charge, but he has to pay the annual maintenance rate for the works.

1779. Mr. Barry.—What was the average cost per acre of the Stoneford Drainage?—I will give you that most accurately. I selected that case because I think the Commissioners of Public Works got counsel's opinion as to how they were to deal with the Act of 1881, and, as well as I recollect, the opinion the Board of Works got was that they could not put an increased rent on any farms for drainage works once the judicial rent was fixed, provided that

the drainage works were completed before the judicial rent was fixed. I believe that is the opinion counsel gave to the Board of Works, and accordingly the Commissioners of Public Works, in dealing with these cases I have referred to, had to act upon that. I have here a table giving all the particulars of all the drainages I myself carried out, and any question I may be asked I will answer. You asked me the average cost per acre of that particular drainage: £3, 18s. 3d. was the average cost per acre. The average increased value was 9s. 2d.; the drainage itself amounted to 3364 acres.

1780. Would the average price you have given represent Lord Darley's land?—Yes, because the £3, 18s. 3d. per acre is the average price per acre of the whole district. Of course you know what averages are, but I would be able to take up Lord Darley's case, because here is the actual schedule by which the area is defined, and the proportions in which the different tenants and the different landlords have contributed towards this particular work. The Earl of Darley's proportion towards the whole work was 3, exactly half of the whole work. The rate per acre is a quantity for ever going up and down according to the quality of the ground.

1781. My question was whether the average price of £3, 18s. 3d. was a fair approximation to what Lord Darley's charge per acre was?—I think so, on account of his being half the whole. There is no inaccuracy in that average.

1782. Mr. Pitt.—What did you mean by saying that the tenants did not take the full benefit of the arterial drainage—that is, that they did not thoroughly drain their lands?—Very often, in certain cases where the ground is very flat for any considerable distance on each side of the river, the mere sinking of the river itself, if the soil is of a retentive character, will not confer any benefit on the land beyond merely removing the floods. And they did it under a regular system and organisation. They left the land in its unimproved condition till the Sub-Commissioners came down, very likely not on a very fine day, and saw the place, and they said, "Oh, of course this rent that you have been paying for so many years is too high." One is powerless in the matter. I gave most minute evidence in the Court of Appeal.

1783. Can you tell us whether, when the Commissioners went down to value that land, they valued it first in its then condition, and added on to that, before they made up their award, the prospective improvement from the drainage?—No, the drainage had been practically completed, so far as the lands were concerned. There may have been one or two small bridges up country.

1784. How long was it from the time of the practical completion of the drainage till the Land Commissioners came round?—Two or three years. The lands were relieved from floods for more than three or four years before the Commissioners came round, although the award was not made till subsequently.

1785. The Chairman.—Then practically it cost Lord Darley nearly £30,000, and what he got for it was reduced rents?—No, he only owned about half of the drained area. The way that supposed error has crept in is this: The payments are not based upon acres; the payments are based upon the increased annual value, and Lord Darley happens to own half the increased annual value.

1786. What acreage is that: would it be half the 3360 acres?—The total number of acres, as I have already given, is 3364. Then the value of that in its unimproved condition was £3007, and the increased annual value was supposed to amount to £1471. The Earl of Darley owned about 1700 statute acres of the flooded land.

1787. Mr. Barry.—When was the unimproved valuation made?—That was made in May 1874.

1788. When was the judicial rent fixed?—The appeal took place in 1885; and therefore the Sub-Commissioners' decision would be about 1883.

1789. Mr. Abercrombie.—I understood you to say that after the arterial drainage had been carried out, a considerable time elapsed before the ordinary or subsidiary drainage of the land took place?—Quite so.

1790. How many years afterwards was the subsidiary drainage commenced?—About one year after the Sub-Commission reduced the rents.

1791. Then the tenants commenced the subsidiary drainages?—After they got their reduction of rents.

1792. Mr. Barry.—But I suppose there is no evidence that the Sub-Commissioners did not take into account the value of the land as drained?—On the contrary, they would say that they did take it into account.

1793. All we know is, that they reduced the rent more than 9s. 2d. per acre?—All that we are now in a position to state is, that notwithstanding the enormous benefit conferred on the farmers by the removal of flood water,—an injury that was so great, that for years they used to go to the landlord and tell him their crops were swept down the country,—the Commissioners came and reduced the rent.

1794. Mr. Pitt.—Was this chiefly tillage land or grazing land?—The greater part of it was grazing land, and coarse meadow. Now in the same district there is a remarkable case. The owner has often expressed to me his great dissatisfaction with the case that I am about to mention; and for fear I might make any mistake in the figures, I took the precaution, on being told that I might be asked to give evidence here, of getting a letter from him with the figures in it, and with your permission I will read the letter.

1795. Mr. Barry.—Is there any objection to our having the name?—Oh, certainly not. The letter is written by Latin Thunder, Esq. He is the chairman of the Stoneford Drainage Board, and he was one of the most active promoters in the district.—"Dear Sir, I received your letter this morning, and I now write as requested, with the information you require. Lislogher Farm contained 563 Irish acres, equal to about 213 statute measure. The rent of the farm is £758, 10s. 7d., value £754. The annual charge for the river is £215, 18s. 4d., out of which my tenants are only charged with £8, 0s. 10d., leaving an annual charge to be paid by me of £307, 12s. 6d. Indeed, up to the present, I have had to pay the whole charge myself; but I shall have to trust upon the tenants paying the amount that has been charged to them. They hold about 44 acres from me at the same rent as I pay myself to Colonel Tighe, and as the annual charge for the river on their holding is about £22 per annum, I am now losing (supposing they pay the £8 that has been assessed on them) about £14 per annum, which I consider a great hardship. The Commissioners have saddled me with the whole of the drainage charge, because they said my landlord was deriving no benefit from the drainage during the term of my lease—the life of the present Duke of Leinster; but the addition of £307 per annum to my rent makes my farm a dear one these bad times, and I have not had the smallest accession made to me. When my late father and myself agreed to the sinking of the river, it was on the understanding that the expense of the work was to be shared between landlord and tenant; and it was not until my father was assured on this point by the late Charles William Hamilton, Esq., on the part of the landlord, that he gave his consent to the scheme." Now, that is a remarkable letter. The tenant holds under a head landlord,—the life of the lease is the Duke of Leinster,—and the tenant is now assessed with the whole of the annual payment for the improvements. He has sub-tenants under him, and he has to pay £22 for the drainage charge on their holdings; and the Com-

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missioners under the Act of 1863 have only assessed £8, 10s. on the occupiers for that holding.

1796. This gentleman is a tenant, and not the owner?—He is a tenant.

1797. Is he occupier as well as tenant?—Yes; but the Act of 1863 would entitle him to get some relief.

1798. Mr. Pim.—What he is paying is not a capital sum, but the annual interest and sinking fund on the capital sum?—Quite so.

1799. If the Duke of Leinster lived for the thirty-five years during which he is paying it, he would have got the full value out of it?—Well, he would have got it for the thirty-five years—he would have got the benefits during the thirty-five years.

1800. But if the Duke of Leinster dies within the thirty-five years, his lease expires, and the payment expires, and the remainder of the charge falls to his present landlord?—Yes; but under the Act of 1863, if a man has forty years unexpired, he is considered owner, and he pays the whole; but if he has a shorter period of time to enjoy the benefit of the farm, the landlord is considered to have a reversionary interest in the improvements, and they have been made to contribute under the Act.

1801. Pardon me: if there is that power under the Act, why was not it applied in this case?—That is what puzzles the tenant.

1802. Mr. Barry.—Has the Land Act of 1881 anything to do with that?—It has not. It is a matter of opinion on my part; and I cannot state it accurately, but I believe this gentleman was frank enough to come forward and say that the improvement of his farm was very good, whereas the other tenants in the district kept that back; and the landlord then said, "You admit the improvements are very good, and, as I am deriving no benefit from the land while it is in your possession, I must try to resist paying any portion of the charge myself." The peculiar feature of the case is the shortness of the tenant's interest.

1803. Mr. Pim.—Is not it only as regards the sinking fund that he really has any claim upon his landlord?—That is so. There is a second case of some importance as a matter of principle. If under the present Act you carry out an arterial drainage, and there are forty tenants away from the out that you make, if there is no new out brought up to each of the holdings, they can resist paying or contributing towards the drainage charge, on the ground that there is no outfall brought up to their holdings, although the floods may be taken off. A case of that kind occurred in the Stoneford Drainage. In order to try and correct that, we made a cut up to the holding that the tenant objected to pay for, and after the cut was made, and after the outfall was brought into his farm, he then objected to pay on the ground that the meeting appointed to consider the draft award was held on a particular date, and that the new drain brought up to give him an outfall was cut at a subsequent date. That case will illustrate in a very remarkable way one of the great difficulties that will have to be dealt with as regards the future, because no arterial drain could possibly touch all the tenants—it could only touch a very small percentage of the tenants; and, moreover, as the landlord has now no power, practically speaking, to go in amongst the tenants and to do anything in the way of bringing the outfalls up to their farms, a very serious question will now arise: If you propose a drainage with, say, forty miles of main arteries, how many miles will you have to add to the forty to bring the outfalls in touch of the tenants' holdings, they now being held under what is now known as judicial leases? It appears to me that that is a difficulty that will really require very careful treatment. The difficulty I have just referred to was one that was always easily got over before the passing of the Act of 1881, because before the passing of that Act the landlord paid the whole of the drainage charge, and he then got his tenants, sometimes by arrangement or by consent, to contribute

towards the payment, and he either brought the minor drains from the main outfall to the tenants, or it was one of the conditions of the agreement that they were themselves to open up the minor drains, so as to bring their farms under the influence of the outfall secured by the main artery. You will now find that under the Act of 1881 the landlord is practically debarred from doing that, and I am not at all clear at present how that difficulty will be got over.

1804. Mr. Barry.—Is there any general power for one man to cross another man's land for draining?—Not unless you seek to avail yourselves of the compulsory powers under the Act of 1883.

1805. I mean, supposing tenant A. is adjoining an improved river, and tenant B. is behind, is there any power by which tenant B. can drain through tenant A.'s land into the river?—If tenant A. has got a judicial lease, for all practical purposes as far as the tenant outside him is concerned he is the owner of that property, and he must deal with him as a Railway Company would be obliged to deal with the owner of land.

1806. I mean, is there any compulsory power?—No.

1807. Then it must be by agreement?—It must be by agreement; it is a very great difficulty.

1808. The Chairman.—It must be, because it gives such a monopoly to the farmers on the river.—But a more serious question arises. I would say that with regard to a river, where there were eighty miles of works under the old system of 1863, 160 miles of minor drains would have to be added to meet that difficulty, to get in and out through all the farms.

1809. Mr. Pim.—Had you the compulsory power before of doing it?—I mean, had the Drainage Board the compulsory power of doing it?—No. That is the point that they upset us on. We had our award made on a certain date. The tenant kept silent. He had all the benefits of the drainage, practically speaking. The floods were off and everything, and he kept back, and then he made his objection. He said, "You have not brought the minor outfall up to my holding, and I object to pay it." Well, I, acting for the trustees, said, "It is a pity that one tenant should be saddled with any extra cost by reason of another getting off, and I think the proper thing to do is to run up a minor drain;" and I accordingly did so, and then I intimated to the Board of Works that I had done so, they having promised to keep back the final award until I had done so. They then gave notice to the tenant, and the tenant said, "I object that the drain which you have now made was not on your plan, and it is not a work properly included in the scheme."

1810. Do you mean to say that in order to have the compulsory power of making one of these drains, you must show it on the plans you originally lodged? Quite so; that is what I say. If you have to add to the eighty miles of ordinary river work the minor drains, to include all under the Act of 1881, it is far more likely to amount to an additional mileage of 160 miles plus the 80. That is according to the present state of the law.

1811. Mr. Attorney.—In fact, lands removed from the main artery are practically excluded from forming a junction with that main artery, except by agreement with the party holding the land in the immediate proximity?—That is solely in consequence of the passing of the Act of 1881.

1812. How was it before the Act of 1881?—Before the Act of 1881 the landlord paid the charge of the whole townland, and there might have been one hundred tenants on that townland. Then, after he was made to pay, he had to go among his tenants and make an arrangement with them. He would say, "Pat, I will pay so much, if you will pay so much, and you must all among yourselves clear up the sub-drains to bring the outfall up to your farms;" and they used to agree to do it by arrangement and by consent, and sometimes, when the



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work was a large one, the landlord would himself do such additional work as would make it possible for the tenants to come at it in detail afterwards.

1813. Then it was effected previously by the landlord's power and control over his tenants?—Precisely.

1814. And that has now gone?—It has gone. I will now go on to deal with the question raised by your paper: "What changes in the law are needed in order that districts still requiring drainage may be relieved?" Should Government decide merely to revise the Drainage Act of 1863 to meet the new requirements consequent upon the partial change in the ownership of land, I am of opinion the said Act would have to be altered as I have described. Then the same observation applies to the proposed Bill of 1883. I fear neither the last-named Bill or a revised Act of 1863 will meet present requirements, as I am of opinion that the Irish Board of Works, as at present constituted, has too many duties cast upon it. No three men and their subordinates could do more than the present Commissioners have done. It is impossible that the chief engineer and his assistant, having each day to deal more or less with a large correspondence, estimates, and designs, could possibly find a fractional part of the time required to promote successfully a workable arterial drainage scheme for the whole of Ireland, even assuming a good working arterial Drainage Act already passed into law. In order, therefore, to give every facility to the present and future owners of land to promote arterial drainage works, I would favour the formation of an entirely independent and central Arterial Drainage Department in Dublin, to be divided into three subdivisions: Division 1, Arterial Drainage; Division 2, Arterial Drainage Maintenance; Division 3, Thorough Drainage. When formed, each department should at once proceed to collect records of works already executed under each subdivision. They should then proceed to complete the survey and schedules of all the main rivers that from their neglected condition are considered to be the cause of flooding considerable areas of land, or, although not flooding lands, may render it impossible for the adjoining owners to obtain sufficient cash for their own drainage works. The department should then preserve careful records of the daily rainfall, and rise and fall of summer and flood waters for a period of not less than five years. With this valuable information secured before the designing and execution of works, large sums of money might be saved to future Drainage Boards (schedules to be prepared in abstract only); first, by enabling them to reduce the earthworks to a minimum when the volumes of flood waters are known with accuracy; second, by protecting Drainage Boards from bogus claims caused by supposed increased flooding, by bringing into court the records of the floods for five or more years previous to the execution of works; third, by preparing carefully sections of the main rivers of the first, second, and third class in magnitude, and subdividing them into suitable lengths corresponding to the positions of the natural sudden declivities or cutfalls mostly found in rivers, so as to reduce the magnitude and cost of the scheme to be hereafter dealt with by the local authorities. In this way large schemes designed as a whole could be hereafter carried out in subdivisions. This would largely reduce the interest money now paid under the present system. Fourthly, this would favour the formation of smaller but workable districts under the superintendence of Drainage Boards acquainted with the localities, with which their interests are connected, instead of having from twenty to twenty-five years in trying to chain assents from hostile proprietors (small proprietors, mostly encumbered) to costly drainage works situated in adjoining or distant counties, as in the case of the Barrow Drainage. Fifth, I am of opinion that properly designed drainage works can be easily executed, and last for an immense number of years, provision having been made for a

judicious and economical maintenance. I would be in favour of the Treasury granting loans for arterial drainage, the time for repayment to be extended from thirty-five to forty-nine years (or even more) in all cases when necessary, as it would be hopeless to expect that the capital required for large works could be repaid in thirty-five years, having regard to their more costly nature as compared with small districts, and the probable permanent fall in the value of land in this country, and to the fact that it will be difficult for the occupying tenants to get their landlords to contribute towards works for the exclusive benefit of the tenant, but at the sole expense of the landlord.

1815. The Chairman.—That carries you now down to the sixth heading?—Yes. One of the reasons that some of the drainage works are costing so much money at present is owing to a defect in the Act of 1863. In a drainage work of eighty miles there may be sixty miles completed for two, three, four, or five years. The remaining miles may be of a difficult nature, and during the time that they are trying to complete the difficult work the tenants over the whole district are in full enjoyment of the benefits conferred, but while they are so in that enjoyment the interest money is accumulating, and has to be added to the cost of the works, all of which is assessed on the landlord—that is the money value of the benefits that are received.

1816. Do you know of a case of that kind?—I do, and I am able to give one.

1817. So far it is a supposition case.—I shall be able to give it you most assembly. Shall I do so now?

1818. Have you got it in writing?—I may refer to it further on. Then the sixth heading: "Proposals that have been made: (a) charge to be direct on occupiers; (b) Drainage Board to be elected by occupiers as well as owners." Having regard to the fact that the Land Act of 1881 secures to the occupier an almost larger interest in the land and its improvements than to the landlord, I fear there is no way of avoiding the proposal to charge nearly the entire cost of the works on the occupiers, otherwise the great majority of the landlords will use all their influence to protect their reduced rents from being further reduced by drainage charges for works from which they can derive no substantial benefit. I think both occupier and landlord should be represented on the Drainage Board, but as the ultimate success of any large drainage work in a measure would depend upon the Board being composed of educated men with a proper capacity for business, I trust steps will be taken to secure that the officers of the Board may always have the advantage of the support of a strong Board, composed of men of education, business capacity, and singleness of purpose. Without these conditions being secured, it would be hopeless to expect that a local Drainage Board, composed of a number of struggling, hard-working tenants, commanding a majority of votes, with little education and very little knowledge of business, could successfully complete any large work when brought in contact with professional experts, representing the claims of hostile contractors as well as claims from tenants for damages, &c. Too much attention cannot be given to this part of the subject, as much money has already been wasted by the acceptance of imperfect tenders. The next is the seventh heading: "If drainage charges were imposed directly on occupiers of land, how should they be recovered?" As an engineer, I do not consider my opinion would be of any value on this point unless a method somewhat similar to that now adopted for dealing with the rent charges under Lord Ashburton's Act might be followed. Under the Drainage Act of 1863 the Treasury had a most perfect security for all moneys advanced for drainage purposes until Parliament practically destroyed it by the passing of the Land Act of 1881; and it is not too much to expect that

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Parliament should now solve this difficulty of their own creation. Then the eighth heading is "Area of contribution." This subject is one of great importance. The towns in a river basin might derive no practical benefit from a proposed arterial drainage, and therefore should, in my opinion, be exempt from any contribution. Others might be made to contribute in proportion to the benefits derived based upon evidence and arbitrations, or, in the case of want of an outfall, then on the cost of securing the outfall in some other way, by pumping or sinking shafts, or diversion of waters, &c. I merely throw that out as a suggestion as to how it might be possible to arrive at the proportion of the cost. With reference to the second query under this head, few people in this country understand the full meaning of this query, viz.: "Should all land in river basin be made to contribute, whether directly benefited or not? If so, in what proportion?" This is a subject I have carefully considered, having already read a paper on it before the Society of Arts in London and elsewhere. As a rule, I find the larger the river basin and the more costly the river works, the smaller is the percentage of the whole river basin injuriously affected or covered by flood water, and therefore the smaller the area to be directly benefited by the drainage works. Notwithstanding that the practice in Ireland is only to tax the area of land directly benefited by a drainage work, it has been found in numerous cases impossible to get even assents representing two-thirds of the interests to be benefited, although in some cases the proposed tax was nominal. Assuming that in future Parliament will not sanction taxation without a proportional representation, I fail to see how any future drainage scheme could be carried, if, in addition to the difficulties we have already experienced in inducing the parties who knew they were about to derive a direct and immediate benefit, you add a greater difficulty in trying to induce the owners of property representing, not the small 7 per cent., but the 93 per cent. of the whole river basin to contribute (no matter in how small a degree) to a drainage work they have no direct interest in. To put a compulsory tax on 93 per cent. of a country for the benefit of a 7 per cent. of the same country would raise such a public outcry that it would render the best Drainage Act inoperative in a very few years. I think I have previously explained that 7 per cent. as a rule is a high average of the lands injured in a river basin, and therefore there is the 93 per cent. outside it. It has been urged that it would be a most reasonable proposition to make the 93 per cent. of high lands (sending 93 per cent. of the flood waters over the 7 per cent. of flooded land) pay for the relief of this flooded land, thus increasing the owner's interest in the 7 per cent. perhaps 100 per cent. at the expense of the upland proprietors. I believe much valuable time would be lost in trying to establish this principle. The purchase money paid for the dry upland estates composed of soils of a given quality were greater than for estates composed of similar soils in the low lands, but covered or subject to annual floods. Why then tax 93 good acres to benefit 7 bad acres, when the former had to be purchased at a higher rate than the latter because the latter were in full possession and enjoyment of the floods from the former during previous generations. I am aware there are two principal reasons assigned for taxing a whole river basin. One is that the climate over the whole basin would be improved. I cannot see how draining 7 per cent. of a river basin could permanently improve the climate over the remaining 93 per cent., or even the value of the produce over the 93 per cent. On referring to my evidence given before the Royal Commissioners appointed to inquire into the Dublin main drainage (see p. 111), it will be seen that the wind blew for 133 days from the west and south-west, and 83 days from the east and south-east, or 216 days out of the 365. These facts, it will be found,

apply generally to the whole of Ireland, so that the benefits conferred on the 93 per cent. would vary according to their situation as regards the 7 per cent. This view would also apply to the variable benefit to be derived by a town. I do not think I need say any more upon that.

1819. Mr. Abercrombie.—I should like to put a question to you upon this. You have adduced one instance, and you speak of climate; but is it not a fact that, as a general rule in all the catchment basins, ordinary drainage has now been carried on of late years to a very great extent, and thence a much larger volume of water is discharged upon the low lands in a shorter period of time than in former years?—My answer to that is this, that, taking the whole country, I believe the percentage of thorough draining carried on compared with the whole country is very small.

1820. You apply that question to Ireland?—Yes. I quite agree with you that if one could hope that any considerable area of the country was to be thoroughly drained, I then think that a most tangible benefit would be conferred upon the country generally, but the percentage of the area that is drained in Ireland is so small compared to the whole of the area, that I really believe it would be safer for the present not to attach any great value to the improvements conferred upon our climate.

1821. You have your argument on the fact that ordinary drainage of lands in Ireland has been carried on to a very limited extent?—A very limited extent.

1822. But supposing it should be carried out, as in many parts of England, to a considerable extent?—Then in that case the benefit conferred by that operation in Ireland would be smaller than in other countries, because we suffer, not so much from the action of the soil, but from the superabundance of rain carried in from the sea by southerly winds.

1823. I am speaking of the question of drainage. Supposing that the uplands were thoroughly drained, as in many parts of England, would you not then think that, as they would then discharge undoubtedly a larger volume of water in a short period of time on to the low lands, they should then contribute?—My answer to that, then, would be, that from the month of March to November the climate would be slightly improved.

1824. I am not speaking of climate; I am speaking of the volume of water discharged, and the rapidity with which it is discharged on the low lands. Supposing thorough drainages was carried out in Ireland as in many parts of England, and the uplands were thoroughly drained, and a large volume of water discharged on the low lands in a shorter period of time than at present, in that case should not the lands in the general catchment basin more or less contribute?—There is no doubt that thorough draining the land enables a certain quantity of water to be sent down quicker than it came before.

1825. And that causes floods?—But if you follow it up very carefully, you will find that that action goes on sooner before a flood when thorough draining than afterwards, and that the effect of thorough draining is to prepare a large sponge dry to receive the first parts of the flood, and to check it temporarily in getting down to the low lands, only while it is being surcharged.

1826. If lands are thorough drained in England, it has been found that very large floods occur, which did not occur in former years, from the water discharged from the catchment basin generally on to the low lands. That is found to be a fact. Then there is another consequence. In many cases, towns situated in the lower valleys are flooded, that were not flooded in former years; and roads and communications leading across the valleys are also

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flooded and impassable for days together, to say nothing of bridges being carried away!—I may mention that I am aware of the fact that many gentlemen of great eminence do hold to the opinion that thorough drainage increases the volume of flood sent down to the lowlands. I do believe in certain cases that is true, but I think there are exceptions to it. I am also aware, and I should be sorry to make any statements to the contrary, that there are several cases of eminence held to the belief that arterial drainage has the effect of increasing the volume of floods sent down to lowlands. In some cases they are correct, but I believe from evidence that I have collected in Ireland, and from observations I have made, that the number of cases where the effect of arterial drainage has been to increase the floods sent down to the lowlands, is much smaller than the number of cases where arterial drainage has had no practical effect in increasing the flood volume. In point of fact, both views are right when applied to particular cases.

1827. The Chairman.—Yesterday, and again to-day, you laid great stress upon the percentages of 93 and 7 per cent. Upon what do you base those? Is it upon any particular district, or does it apply generally throughout Ireland?—If my observation only applied to a particular district, it would really be of no practical value; but it will be found, if you take a large number of cases and test them, that 7 per cent. is a high average.

1828. Take a particular case.—There may be of course exceptions.

1829. I suppose you will admit that there are few cases of more importance or larger in extent than the Barrow?—Yes.

1830. There a calculation has been made, in which it turns out to be 11 per cent. I—I have it here. Saturated and flooded lands would amount to 11·1, but in the case of the Barrow that 11·1 includes both the land covered with flood and the land not having a sufficient outfall.

1831. It is flooded land—land that is injured by the retention of water upon it?—It is so; but it is made up of two quantities—the 11·1.

1832. I quite follow you; but nevertheless we find that in the Barrow district there are about 46,000 acres out of 497,000 acres, the whole catchment basin?—I quite admit that, if you add the number of acres that are not covered with water but are saturated to the number of acres covered with water on the Barrow, it comes to what you say—11·1.

1833. That is, the land that is injured by the water?—Yes.

1834. Does not that disturb a good many of your calculations?—No. The land that would contribute to increase the volume of flood is the area of land holding up ponded water previous to the execution of arterial drainage works,—keeping it back in the form of a pond, and then it is supposed that the effect of the arterial drainage works on that pond is to make it go down.

1835. Mr. O'Brien.—Therefore you have saturated land under a certain condition, which retains water, but if you carry out thorough drainage, the water, instead of lying on the land, and gradually filtering and passing down to the river, is discharged all at once into the river?—Quite so.

1836. That is the cause of floods?—Yes.

1837. The Chairman.—Then there is another point I want to call your attention to, that this 7 per cent. and 93 per cent. is liable to fluctuations according to the district?—It is liable to fluctuation, but it will be found that the number of acres that do the greatest mischief are the number of acres covered with the flood water, or covered to a considerable height with water. I say that that seldom amounts to 7 per cent. in the districts in Ireland.

1838. Mr. Barry.—Take the case of the Barrow, for example. If you have 11 per cent. of the total area of the catchment basin which is improvable, and that 11 per cent. is improved and doubled in value, the rateable value will then be doubled of that portion. To that extent the whole catchment basin will be gaining a benefit by the diminution over the remaining 88 per cent. of the rates that were formerly necessary. Is not that so?—Yes.

1839. Then it is fair that the whole catchment basin should get that advantage without any contribution?—I think that the benefit on the 11 per cent. would confer such a slight benefit on the remainder of the basin, that you would find, when the experiment is tried,—assuming that you will not have taxation without representation,—you would have an element very difficult to overcome, that is, the hostility of the parties who would be deriving what they would consider no direct benefit for additional taxation.

1840. If you raise the rateable value of a proportion of the whole area, you would diminish the rates upon the remaining portion of the area?—Very slightly.

1841. But to that extent?—Certainly. There is no doubt you have put a perfectly fair case, and the case you put cannot be denied; but the point I make is that the relief given to the 93 per cent. by reason of the improvement in the 7 per cent. is so small that the proprietors of the 93 per cent. would become hostile to the proposal.

1842. The Chairman.—Will you now proceed to No. 5?—It has been suggested that the Government should take the initiative. I have already pointed out, under heading No. 5, that the formation of a properly organized Central Drainage Department would be of great assistance to the proprietors of land in assisting them in determining the remunerative districts and the order in which the works might be carried out, based upon the information obtained from the Government surveys as to rainfall, flood discharges, natural outfalls, and cost of works, &c. On the Government completing the survey of a river basin, the fact should be made public, at the same time intimating that, should the local parties exert themselves in procuring suitable sub-districts, loans might be obtained, to be repaid in thirty-five or fifty years, according to the magnitude of the work. That is all I have to say upon that head. Then, as to heading No. 10, I say that ample precautions could be taken by the Central Drainage Department, when preparing the survey of the whole river, to subdivide the river basin in such a way, and to require the divisions to be executed in a certain order, so as not to cause increased flooding to an injurious extent.

1843. Now we will go to maintenance of arterial drainage when complete. What should you propose as to that?—Under the Drainage Acts now in force, it is possible for the occupying tenant not only to get his rent reduced for the land drained at his landlord's expense, but it is also possible for the tenant to neglect the river-banks, thus materially adding to the cost of the maintenance work, and under the new Maintenance Act to make the landlord pay the whole maintenance rate. Yet by the Land Act of 1861, subsequently passed, the landlord will have to deduct both the original drainage charge and the extra maintenance drainage rate out of the reduced rents he receives for the drained land. The fact is, the landlords are beginning to feel the injustice of this state of things, and if not corrected it is more than probable they will use their influence to make drainage works difficult and costly, as certain rights will no doubt be reserved to them until they sell their properties to the occupiers or others. Under all the circumstances of the case, I fear the present Maintenance Act will have to be revised, by making the occupying tenant liable for the maintenance rate. He pays county cess for roads, &c. Why then

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should he not pay for a work conferring a more direct benefit on him than a distant road?

1844. Not giving examples in other directions, that is your opinion, that the occupier should be charged?—Yes. I see no way out of that. The above are some of the reasons why the maintenance works are generally neglected throughout Ireland at present. I also find that the parties interested object to spend their time in attending Board meetings, so long as the floods do not rise to cover their land; but later on, when the obstructions become greater, they begin to talk about the subject, but then the damage is done, and costly maintenance works become necessary. To prevent the recurrence of this state of things, I would provide for a Government inspection of the works every three years, and that they should have the power to send to the local Trustees (if necessary) a compulsory order to repair the works.

1845. Your last remark embraces the third heading under maintenance—enforcing the law against persons who neglect their duties.—I have not considered the point beyond what I have stated. Then the next question is: "What are the relative advantages of large and small maintenance districts?"

1846. That, I think, you have dealt with in your previous evidence, and you have stated that you prefer having larger districts instead of a number of small ones.—That is not quite so. It is difficult to lay down any rule on this subject. It may be assumed, however, the nearer an arterial drainage is to maintains the greater the damage done by the greater velocity of the water, and the greater the cost of maintenance, assuming the length of river and the number of acres per mile drained to be the same. The cost of maintaining lowland rivers with small inclinations per mile might not cost half of what the former would cost. The cost of supervision would be slightly in favour of the large work per mile or per acre, but a different state of things exists as regards the first cost of the original arterial works. The cost of arterial drainage works per mile varies nearly in proportion to the new sectional area of the new river cuts; the larger the section the more costly the work. So that a thousand acres of flooded land situated on the banks of a small tributary river might be drained at less than half the cost of the same number of acres if situated on the banks of a larger river, if its new sectional area was larger than the small tributary, on account of the greater magnitude of the work, the greater volume of flood water to be dealt with, the longer time required for their execution, and the larger accumulation of interest money to be added to the cost of works before making the final award.

1847. Mr. Fin.—I think you have severely apprehended the object of that question. What we want to know is this. Supposing you have got a considerable length of river, would you put the maintenance of that river entirely under one Board of Management, or would you have two or three Boards?—I should certainly divide the river into such lengths as would make it practicable for the one officer to be able to control the length; but if the length became so much extended that he was not able to attend to that duty, I would subdivide it.

1848. Take the instance of the Barrow. Do you think there is any reason for dividing the Barrow above Athy into more than one Maintenance Board supposing it was formed?—I know a good deal about the Barrow, and I was employed to oppose the original proposal to treat it as one, and my views on that point are very strong. They have been trying for the last thirty years or more to treat that as one, and I was consulted by the late Duke of Leinster and others to know whether they should have joined in the larger proposal. I find upon looking into the subject the river Barrow can be executed at a smaller outlay by treating it in

subdivisions than it can if treated as a whole. The upland proprietors are very hostile to their properties being in any way taxed for the excessive cost of the lower divisions of the Barrow. I do not think it is a measure that will be easily carried, as a whole. I am quite prepared to give very minute information upon it. To give you an idea of the cost of the work if carried out under the Act of 1863, during the time that the whole work would have to be carried out you would have to be paying interest on the money expended. If you subdivide it, each division could be executed quickly, and it could be brought under award, and in that way the interest money could be very largely reduced.

1849. Provided you had an outfall for your subdivision when you had it completed?—The upper district above Porellington has too much outfall for the drainage, and the Fagle river has too much outfall for the drainage. It was stated, before I took up the Barrow, that it would be impracticable to drain any parts of the Barrow basin without commencing at the bottom, and the late Duke of Leinster asked me to look into the subject, and the result was this, that in the case of the Kildare district we found that, so far from not having a sufficient outfall, we had more outfall than was required, and when I went to get the necessary powers under the Act of 1863, I was opposed by the Marquis of Drogheda on the ground that the draining of the Kildare district would have increased the floods sent down to him. The Inspector appointed by the Board of Works did not entertain that view exactly. He said he did not believe it would have that effect, but that he would allow a reasonable time to elapse before he would grant the district, so as to give the owners of the lower reaches of the Barrow opportunities to carry it out as a whole. That reasonable time elapsed, and I then called on the Board of Works to give me power to carry out the district as a division of the Barrow, and they had to give me the power; but you will see by an examination of this tracing that the execution of the works could not have had the effect of increasing the flood volume, because this [pointing to the tracing] was the indication of the country that I drained, and you will see that the inclination is too great to hold any considerable quantity of ponded water, and there was no way of preventing my carrying out the works had they tried. The same observation applies to the Rathangan. It was considered that there would not have been sufficient outfall to have carried out the Rathangan Works at the time, but, when the Duke of Leinster asked me to take up the matter, I found that so far from there not being a sufficient outfall there was too much. I was able to successfully drain the Rathangan District, and you will see by this tracing that in that case too there was no ponded water, in the sense that it was kept stationary. The valley of the river was so small that the water you are covering the land was really in motion, and it used to go down. The only effect that my works had was that during the commencement of the rains before the works were carried out the river used to be a dam, so to speak. The rains could not get down into the river valleys, and the water gradually accumulated above the banks, but after the execution of the works the earlier portions of the flood were able to reach the new river cuts very much sooner than they did formerly, and in that way there was a longer number of hours secured for the drawing off of the flood, which prevented the volume being increased.

1850. Mr. Abernethy.—That would be the case if it was a local rainfall; but supposing that the rainfall was general in the whole valley of the river?—I am aware that it is a very long history to go into as to the effect of Arterial Drainage Works on the increase of floods, and so on. If you have no objection, I will

had in a copy of the paper that I wrote on that subject, and which I read before the Society of Arts, and also a copy of the paper on the same subject

which I read before the Engineering section of the British Association in Dublin.

Jan. 6, 1887.

Mr. James  
O'Keefe.

[The witness withdrew.]

Adjourned to to-morrow at half past ten.

NINETEENTH DAY, FRIDAY, JANUARY 7th, 1887.

Jan. 7, 1887.

36 MERRION SQUARE, DUBLIN.

Commissioners present—Sir JAMES ALLPORT (Chairman), JAMES ABERNETHY, Esq.,  
J. W. BARRY, Esq., J. T. FINE, Esq.

Mr. Cornelius O'Keefe called in and examined.

1851. The Chairman.—I think you are a Sub-Land-Commissioner?—Yes.

1852. Where do you reside?—I reside in Cork, but I form ten miles from Cork.

1853. You desire to explain your views upon this drainage question. I presume you have had this list of questions submitted to you?—Yes.

1854. Are there any particular questions in this list which you desire specially to call attention to, or do you wish to go through the entire list?—I think it would be as well to go through them all. Some I have made or no observations to make upon.

1855. In the first instance, if you will go through the list, reading the questions as you proceed to notice them, we shall be glad?—No, I do "Importance of Arterial Drainage to Ireland." I consider that, as a large proportion of the land of Ireland is under water, or saturated with water, that the climate is, in consequence, wetter and colder than it would be if the land had been drained, or this excessive moisture got rid of. In addition to the improvement that drainage would effect to the climate, I think it would have a very important influence on our agriculture.

1856. Do you refer to any particular district?—I am speaking generally. I think that that question of climate would not be entirely confined to the wet districts, that it would have a wider influence than that. I am speaking generally. Of course, the central districts in Ireland, and the low-lying ground, would be affected in the first instance; but, inasmuch as the wet land is more confined to the central districts, the consequence would be that the influence would spread all round, and affect, to a greater or less extent, the climate of the whole of the country.

1857. You do not wish to amplify any remark upon the two first items—"Advantages to land reclaimed," and "Arable" and "Pasture"?—With regard to arable and pasture land, I know that, in my recollection, we were able to grow better samples of corn, better samples of wheat, barley, and even oats, than we can now. Oats have not suffered at all, to the same extent as barley and wheat. These require a higher temperature. I have no doubt that our mean summer temperature has lowered considerably, judging from that fact, and also from the fact that the same samples of fruit are not capable of being produced now as formerly, within the memory of persons living at present. Gardeners cannot produce the same apples, pears, plums, and fruit of that kind. I will take the liberty of handing in a table in connection with the question of climate, as to temperature, which I have taken from experiments made at Greenwich in 1864, with regard to the effect of moisture on the thermometer. You have the whole thing for the

year, and the increase of temperature for each month, and I have put them into quarterly returns:—

Mr. Cornelius  
O'Keefe.

EXPERIMENT AT GREENWICH, 1864.

	Dry Bulb Thermometer.	Wet Bulb Thermometer.	Difference.
	Degrees.	Degrees.	Degrees.
1st Month, January, . . .	43.2	42.6	1.5
2nd " February, . . .	42.1	40.2	1.9
3rd " March, . . .	45.1	41.3	2.6
4th " April, . . .	45.3	42.6	2.7
5th " May, . . .	54.2	49.7	4.5
6th " June, . . .	58.1	54.3	3.8
7th " July, . . .	63.2	58.3	4.9
8th " August, . . .	65.1	59.2	5.9
9th " September, . . .	59.4	55.4	3.9
10th " October, . . .	49.2	45.3	3.9
11th " November, . . .	47.6	43.9	3.7
12th " December, . . .	41.2	39.6	1.6

THREE-MONTHLY AVERAGE DIFFERENCE.

December, . . .	Degrees.	January, . . .	Degrees.
January, . . .	47.1	February, . . .	47.1
February, . . .	47.1	March, . . .	47.1
March, . . .	47.1	April, . . .	47.1
April, . . .	47.1	May, . . .	47.1
May, . . .	47.1	June, . . .	47.1
June, . . .	47.1	July, . . .	47.1
July, . . .	47.1	August, . . .	47.1
August, . . .	47.1	September, . . .	47.1
September, . . .	47.1	October, . . .	47.1
October, . . .	47.1	November, . . .	47.1
November, . . .	47.1	December, . . .	47.1

1858. To what do you attribute that—has not drainage progressed very considerably within the last few years?—Well, I am not aware that it has; there is a great area still untouched. With regard to the Shannon drainage, I am not, perhaps, qualified to speak upon so much as others, but it struck me that it still has a very injurious influence on a very large area of land.

1859. But is the flooding worse than it was in former years?—I have no previous knowledge of what it was. It is only within the last few years that I have seen the Shannon at all, so that I could not say what it was before. I do not wish to be misunderstood with regard to this being the sole cause of the change in the climate; I do not think it is; but I do think that the removal of some of the moisture that we have would improve our climate, and that the cold or variableness of the climate would be very much diminished by an extended system of drainage.

1860. It is rather startling to hear that the growth of cereals is not so good now as it was years gone by?—It is; there is no question of that.

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1861. Mr. Pitt.—Do you arrive at that conclusion from one or two individual years, or by taking a series of years?—In my letter I have said that “Many farmers, although they paid the greatest attention to keeping up the fertility of their ground, discovered that they could not grow wheat of good quality, and consequently it got out of cultivation in many cases, even before the great fall in prices.” Now, I for one gave up the cultivation of wheat before the great fall.

1862. Was your reason for giving it up that you were not able to get as good produce off your land as you got in former years?—The produce was very irregular. I might have a good crop, but it was very variable. One might one year have a good crop, and then the quantity and quality of the produce very indifferent other years. So that I gave it up, and so did several others.

1863. Was there greater irregularity in those recent years you are speaking of than there had been thirty years ago?—Oh yes. I remember, as a boy, that wheat was our rent-paying crop. Wheat was the crop on which the farmer, in the worst-growing districts, relied on for the payment of his rent.

1864. And you could rely on its ripening properly every year?—Yes, certainly.

1865. The Chairman.—Has the falling off been very gradual, or has it taken cycles of years to bring about the present state of things?—Well, there were cycles, but in addition to that there was a gradual falling off. No doubt there were cycles; there would be two or three worse years than those preceding or succeeding them, but still there was a gradual falling off in addition to that—that is, that these cycles were more frequent, and the general tendency was to greater damp and greater cold in the summer.

1866. Have you any returns of the growth of cereals?—No, there is a want of returns. Meteorology had not been attended to in Ireland.

1867. I am not speaking of that, but of the growth of cereals spread over a series of years, say the last forty or fifty years?—No, I have no returns.

1868. But are there any Government returns of the quantity?—Oh yes, I should say so; in *Thom's Almanac*.

1869. Would not those returns corroborate your statement that the growth of cereals is not so great as it was?—Yes, there is no wheat grown hardly. You may travel the whole country, and, except in the neighbourhood of Dublin, you will not see perhaps 20 acres of wheat. Wheat has gone altogether.

1870. Mr. Abernethy.—Has not that arisen recently from the fall in prices?—I have not any doubt that in a great many districts they would still grow wheat if they had better prices. I do not intend to convey that the whole of the wheat-growing was given up on account of the climate, but I say I know many farmers who have given it up; but the wheat was also given up on account of the fall in prices to a far larger extent than from the other causes.

1871. The Chairman.—Will you kindly go on with the questions as you have them before you?—The next is pasture land. I am also of opinion that our pastures would be of better quality if we had warmer summers.

1872. Are you acquainted with the valley of the Shannon?—Well, not so much, except in a fragmentary way. I do not think my acquaintance with the Shannon would be sufficient to enable me to give any very strong opinion upon the subject.

1873. Mr. Barry.—I wanted to ask this question. The Commission have had evidence that winter floods on the alluvial land are rather advantageous than otherwise. Have you had any experience on that point either with regard to the Shannon or any other river?—I would not disagree with that opinion in some cases. I think that where the floods pass off, and where there is not a great deal of stagnant water kept back, there is, in many cases, an amount of deposit

which would be decidedly an advantage, giving a kind of top-dressing to the ground; and particularly if the matter brought down happens to be of a different character from what those alluvial lands are made up of. If, for example, you have a sandstone or gravel soil, the same as there is below Killaloe, the floods from the limestone districts getting over those lands would decidedly improve them considerably. There is no question about that.

1874. On the other hand, evidence has been given that the removal of the winter floods encourages the growth of better grasses, and displace the more aquatic description of grasses, and therefore that there is a very great subsequent improvement, although the alluvials may suffer for the time?—If, as I said before, the lands are sufficiently dry in the summer, this seasonal flooding in winter, I hold the very strongest opinion, would be a decided advantage. I have not the least doubt about it.

1875. You would have that opinion on the quantity of deposit that might be brought down?—Certainly.

1876. Not upon the wetting of the ground?—Not at all.

1877. Mr. Abernethy.—The quantity and the quality of the deposit?—Yes.

1878. The Chairman.—In one of your answers I observe you allude to keeping off the summer floods. Is not it a fact that the crops on these alluvial lands are greatly damaged by the summer floods?—Yes; and if the grass is not eaten here when these floods come on, there is a deposit of clay on the herbage which is very likely to disagree with the animals and do a great deal of injury in that way.

1879. And occasionally the crops are carried away altogether?—They are.

1880. Now, will you go on to the next point, if you please?—“The indirect advantages;” the “effect on climate of district.”—I think I have answered that already. Then the increase of marketable value of course follows the increased value of the land.

1881. Mr. Barry.—When does it follow?—Well, of course, if you increase the rent-paying power of the land you increase its marketable value.

1882. I mean at what date, after the completion of the works, in your experience does it follow?—That would vary. You cannot draw any hard and fast line there. I should say some lands would improve immediately.

1883. The Chairman.—Within one or two years?—Immediately after the water is taken off. If water is kept back as in a sponge, lowering the temperature of all the district so affected, you have necessarily a very inferior herbage on such ground. The moment that is relieved that herbage dies away, and perhaps if any plants of a better quality are in the place at all, they prosper.

1884. I believe by law no increase of the marketable value can be placed upon these drained lands under seven years. Do you think it takes seven years to bring the drained land into its maximum state of improvement?—As a rule I would say that, and I should say much longer for certain lands. In fact, they would not be improved at all without breaking up and allowing the air to have access to them, and manuring, because some of these lands will never grow anything if they have not inherent fertility in them. Such lands, from the mere fact of draining, would never come to anything, and of course you must discriminate. I cannot see how you can specify any particular time in that way, because the lands will vary so much in character even in the same district.

1885. Do you know why seven years was fixed upon?—Well, I suppose that would be assuming that the lands are broken up, manured, tilled, and laid down with grass seeds, and the whole thing cannot be attacked at once.

1886. But I infer from your evidence generally that in some lands the improvement is immediate, in others not so, and some will never be improved unless the

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land is thoroughly broken up?—If you have inherent fertility in the ground, and you have to existance, although sparsely, certain plants that will do in dry ground, it will be more or less immediate; for example, with the life you will have grass growing up; if you remove the water, the iris dies and the grass flourishes.

1887. Mr. Pien.—Then you would consider that seven years was on the average ample time to enable a man to bring drained land into cultivation?—I should not think so, speaking generally. I think the land that would improve so rapidly is rather uncommon. I do not think you have much of it.

1888. Mr. Barry.—Do you mean so rapidly as seven years?—No; immediately I was speaking of.

1889. Do you think as a rule seven years would be an ample allowance?—I think not. I think one course of cropping is not enough for the poor land. I think it must be manured over and over again before it is grass land. It will depend on the district. In some districts it will. Now in Limerick, where you have good and fertile soil, of course it will. There is a great deal of land in Limerick that would pay very soon.

1890. I think in a former answer you gave you said that in certain lands the improvement would be almost immediate?—Yes.

1891. Mr. Pien.—You were of that opinion, because you look upon grass as the profitable business at present?—Well, I do not say that any business is profitable at present.

1892. More so than tillage?—Certainly. I do not think men who are paying for labour at present and tilling have very much profit.

1893. Then you would look upon the tillage that is to follow the drainage as the means of bringing about a good condition of grass?—Yes. But I would be sorry if our future in Ireland was grass instead of tillage. I think it would be a great falling off indeed, and a very great misfortune to the country that it should be so. I have a very strong opinion upon that point, but I am speaking now on the question of paying the farmer. I think it is a very great misfortune that that happens to be the only thing that will pay an Irish farmer.

1894. The Chairman.—Do you think that the growth of cereals is a better cultivation, or more profitable cultivation of the land than the growth of stock?—I do not think so.

1895. Then is not it desirable, if the stock is more valuable than grain, that pasture should be encouraged or increased?—But that means ruin to a great many in the country. What would become of our cities? Our cities now are a market for us, and our towns; but if we convert the country into a mere grazing area, what becomes of the population that are not living by agriculture? I think the rent-paying power and the rate-paying power would all diminish after a while. It may pay for a time, but not for long, if you abolish tillage.

1896. That is assuming that you do not sell your stock?—Well, we cannot sell them to the same advantage when we diminish the number of consumers. You see our cities and towns are supported in Ireland by agriculture chiefly.

1897. Quite so, and if they can get a large price for their stock, and buy cheap wheat to make bread, is not that a profitable commercial transaction?—That is, for the farmer.

1898. Yes?—Oh yes, but see what tillage will do for the country, independent of the farmer, as compared with grazing.

1899. But, naturally, does not it follow that what is good for the individual is good for the nation?—But look at the few individuals who would profit by it.

1900. Perhaps it is not worth while going into questions of political economy of that kind?—Perhaps I would make it clearer to you in another way. The

farmer who can live and support his family on 20 acres of land by tillage, could not do so all by grazing that 20 acres of land. He would require a great deal more land. If he tills 20 acres, he is a kind of way will be able to support his family, and pay his rent, rates, and taxes, and everything else. He buys for the sake of that tillage his implements of agriculture and other articles from our towns. If it is a mere grazing system, he must extend that 20 acres; it must be a matter of 50 or 100 or 200 acres. You diminish (by the mere fact of converting the whole country into grazing) the farming population of the whole country in the first instance.

1901. Perhaps the population is too large at present?—I do not think so.

1902. Mr. Abernethy.—What you state is that these farmers supply the adjoining towns with cereals. They would have to sell their wheat or whatever they produce in the adjoining towns?—Yes.

1903. And people of course have to pay a certain price for the wheat?—Yes.

1904. But supposing that you can import foreign wheat much cheaper than your farmers can grow it, the population will not pay large prices to your farmers when they can get the wheat for less?—No.

1905. The Chairman.—It is hardly worth while continuing this question of political economy. We shall not settle it in this room.—Well, as we have got into it, I think it is a very important question.

1906. Do you think that the drainage of the country improves intercommunication—improves the roads generally, and the means of communication between town and country?—Of course it would improve certain roads that are injured by the floods—not much, perhaps, except in the way that I pointed out at first, by diminishing the rainfall.

1907. Then as to Question 2.—“Amount of work remaining to be carried out with advantage either to the land relieved or to the district in general.” Do you know of any drainage districts where there is a considerable amount of work still remaining to be carried out?—Yes. You see an experience of drainage districts is more or less fragmentary. Our dunes will not take us along the whole course of the drainage, but we run into a farm here and there, and, judging from what we see in that way, I am inclined to think that advantage has not been taken so much as it might be of the deepening of those river cuts. It was along the Mulkear that I saw a farm where there was ample opportunity of drainage. I do not know how long the drainage had been made, but I know there was a part of this land that might have been relieved that I could not walk through at all.

1908. Does not that answer apply to thorough drainage, and not to arterial drainage?—It does, but I am giving you an instance where the land even did not require thorough drainage, but the opening of deep cuts to bring away the water that was locked up into the arterial cut. However I may say that the tenant in that particular case was in arrears. He owed a great deal of rent, and I doubt if he was able to pay. I am not sure about that; but he came to have his rent fixed; and perhaps the fact of his having his rent fixed, and getting his land somewhat cheaper, would encourage him to make the necessary drains.

1909. Then probably you do not know of any such district?—I know of a district in my own neighbourhood, and I know that advantage was taken of it in one case or two; but I may say there still remains a great deal of land in which advantage has not been taken of the deepening of the river by making drainage cuts.

1910. Mr. Barry.—I think Question No. 2 pointed to this: is it your general impression that there is any considerable amount of work of arterial drainage remaining to be carried out?—I think there is a very great deal.

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1911. Apart from connecting the land with arterial drainage that has been carried out—the amount of work remaining to be carried out with advantage either to the land relieved or to the district in general?—That assumes that the arterial cut has been made.

1912. I do not think that was the intention. The intention was to ask whether there was any considerable amount of arterial drainage remaining to be done?—If that is the meaning, I think there is a very considerable amount of arterial drainage wanted.

1913. Your general impression is that there is a good deal of land requiring arterial drainage?—I think there is a very great deal; and I think that, if agricultural were to pay at all, certainly it ought to pay in some of these lands—I think Limerick, and I have no doubt the same would apply to parts of other counties at all events, but particularly in Limerick. I think a great deal of that land would be very much benefited indeed by making some arterial drainage cuts through it.

1914. Mr. Finn.—The quality of the land is in itself good?—It is.

1915. The Chairman.—Then, in point of fact, the districts have not taken advantage as they ought to have done of the Acts of 1862 and 1865?—It would appear not.

1916. Is that your opinion?—That is my opinion.

1917. That these Acts have not been taken advantage of to the extent that they ought?—Not so extensively at all as they might have been.

1918. What causes have prevented that?—Well, I think there might be various causes. One cause is that it remained altogether with the proprietors to have it done, and that they in many cases were slow to move, and indifferent in the matter. A tenant had no interest nor power to move in the matter. I think that would be a strong reason.

1919. That brings us to the next question—“What changes in the law are needed in order that districts still requiring drainage may be relieved?” What is your opinion upon that?—I think as smaller areas there have been examples of very extravagant expenditure in the way of law expenses in carrying out some of these drainage works. I think that would have a deterrent effect.

1920. Then what would you suggest?—I would suggest some less expensive proceeding than having recourse to a Court of Assize and juries. It becomes a very expensive proceeding.

1921. Mr. Finn.—Are you now speaking of where you have to give compensation?—Yes; also, perhaps, you may not have a satisfactory jury in all cases—you may or may not. I think it would be better to have some recognised body to settle these disputes—men who would understand the whole bearing of the question.

1922. But are there not questions in front of that—for instance, as you observed, proposals have been made that the charge should be direct upon the occupier, and that the Drainage Board should be elected by occupiers as well as owners?—That is a subsequent question. We are dealing now with Question 5.

1923. Yes; but then such remedies have been proposed as are mentioned in 4, as to the changes of law referred to in Question 5. Do you agree with those proposals?—Well, inasmuch as occupiers pay the charge, I think it should follow that they should be very largely represented.

1924. Mr. Barry.—Do you think the passing of the Land Act has stopped the formation of Drainage Districts under the Act of 1865?—I am not aware. I think the formation of these districts was going on very slowly before. It would follow, no doubt, that the landed proprietor perhaps would not take the same interest now that he would before, but still he was slow to move even before the passing of the Act.

1925. The Chairman.—But you would be in favour of Drainage Boards being formed of occupiers as well

as proprietors?—Occupiers, inasmuch as they are the taxpayers, and I think they would be the men who would be on the spot and would be able to see best what would suit them.

1926. Would you have any limit to the qualification of an occupier having a number of a Drainage Board?—I think I would dispose of that question in the same way as our poor-law guardians are elected. I would give a vote to a small occupier, and I would give a large number of votes to a larger occupier.

1927. Quite so; but I mean with regard to the qualification for membership of a Drainage Board; would you put a qualification upon that?—Well, I think it would be an advantage that the member should be interested in the scheme, but I should not insist upon that. I think it would be more desirable that a member who would not be perhaps so much interested, and had more intelligence, should be elected.

1928. Yes, but all who have land either as occupiers or owners would be interested in the scheme. A man of £5 assessment would be interested, but do you think that a low qualification like that would be sufficient?—If he were possessed of the necessary intelligence and character, I should not like to shut him out if he were elected; I think the tendency would be not to elect a man who was not fit. The probability is that a man of that limited means would, also, as a rule, not have the necessary experience and intelligence.

1929. One or two influential men have given in evidence before us the opinion that a qualification of £50 assessment should be the minimum qualification for membership?—Well, you see he may have £50 assessment, and the great bulk of that assessment would not be within the drainage area, but certainly I would not insist upon that. I think I would be inclined to take into account the quantity of land that he had within the drainage area more than the total amount of land that he had. I think it would be a desirable thing to have the man who would have the largest interest in the drainage works—not that he paid the largest rental, because the great bulk of his farm might not require drainage at all.

1930. Mr. Barry.—Whatever qualification you thought desirable should be a qualification within the area to be drained—not merely a qualification to the county area, or anything of that sort?—Suppose a landed proprietor in the district was not the occupier at all, it would be very hard to shut him out, if he were elected. I do not think that should be insisted on. I think I would give scope to them to elect.

1931. Mr. Finn.—Your idea is that the voting power should be in direct proportion to the area or the value of land within the drainage district?—Yes.

1932. And you think that would be sufficient security that they would elect suitable representatives?—I think so. I think I would limit them to men within the district. I would not bring in strangers to the district, except landed proprietors having an interest in the district, even though they do not live in the district.

1933. The Chairman.—Do you know a Drainage Board consisting of members who are not occupiers or owners in the district?—I do not know of any.

1934. Then it is fighting a shadow to guard against that?—The thing is altogether different now from what it would be under such a system. I would give voting power now to the occupiers and proprietors.

1935. The question is, how far it is desirable to have men who have a stake in the district to be drained, and whether they should have such a qualification as implies a considerable stake. Would you place any qualification upon a man's eligibility for membership of any Drainage Board? if so, to what extent would you require that qualification?—I would be inclined to leave the selection of the local Board altogether in the hands of the electors. You might



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suppose a case in which the district did not afford suitable men, and it would be very hard to limit them then to the selection of incompetent men. As a rule, I think it would be very desirable that you should have good men within the district. There is no doubt about that, but if they were not there, the next best thing is to go outside.

1936. Is not that provided for in the present Act of Parliament of 1863? The Board of Works have the power of appointing the first Drainage Board in a district; that probably assumes that there are no people in the district who thoroughly understood the question, so as to be able to carry it out effectually. Is not that provided for in the Act of 1863?—I would let the Act speak for itself.

1937. But if it is so, does not it meet your view, that you might have incompetent men in the district, and it would be desirable to bring in outsiders? Does not the Act of Parliament provide for that, by giving that power to the Board of Works to appoint the first Board?—But I would suppose that you would have a local Board to look after its interest.

1938. The Board of Works has the power to appoint the first Board.—Then, in point of fact, you take away—

1939. I am taking away nothing. I am telling you what is in the Act of Parliament.—Yes; but I am giving you the objection. I say that would take away from the occupiers the voting power that I suppose you would give them.

1940. Have you studied the Act of Parliament?—I have not.

1941. Then I will not persevere with the question. Have you anything further to remark upon anything in the first page of these questions?—No. 7.—“If drainage charges were imposed directly on occupiers of land, how should they be recovered?” I would say in reply to that, in the same way as the county cess is recovered. If, however, land was purchased, say by a tenant under the Land Act, I think the instalments there might be paid with the instalments of the rent by him.

1942. But the General Assessment Act gives certain powers for recovery of rates due. Would you think the same power should be extended to the recovery of drainage charges?—I think so.

1943. Now, will you take the area of contribution? I will put a question to you upon that. Do you think that the towns in the neighbourhood of undrained land are injured, in a sanitary point of view, by the present state of things?—I decidedly think they are.

1944. Would they not be greatly benefited, although not flooded, by an improvement in the climate of the district?—I would not say they would not be flooded; I think, as a rule, the water from these drainage districts would supply the towns, and I think the effect of the drainage would be to bring away the rainfall immediately, and perhaps cause some flooding.—I think that probably would be the first effect. Then, on the other hand, it might diminish the water supply in summer. I think you would have a more uniform supply coming to the towns by its being kept back, as it were, in cases than there would be after the drainage project was completed.

1945. That is hardly the question. The question is—Would not the towns be benefited by the surrounding land being freed from the water?—The atmosphere would be benefited, but, on the other hand, I think they would suffer a loss from the change in the water supply. I think, if there was not a provision made, the fact of a great deal of water coming suddenly in a town would cause flooding. Many of them are low-lying, and I think there would be more risk after drainage in that way than before.

1946. But, assuming that the town is placed above the line of flood, but that it is surrounded with lands constantly flooded and saturated with water, would that town be benefited in a sanitary point of view?—

If it were sufficiently above the lower ground, the effect of its being so elevated would render it comparatively independent of the amount of good that would be effected by the drainage. I think the towns that would be benefited most in that way would be the low-lying towns.

1947. But you would approve of towns being assessed in proportion to the benefits they received?—As a matter of fact, I do not think the towns can bear it. The towns are very heavily assessed. In Cork they pay at present, at least, 11s. in the £ taxation, and I have noticed myself, within the last week, that, in the most desirable districts in the town,—that is, Sunday's Well and St. Luke's,—there are more houses to let than there have been since 1847. That is in the best districts, where it was nearly impossible to get a house before.

1948. Mr. Parn.—But will you take some of the smaller towns that would be lying in a district which is now subject to floods, and which might be drained. Do you say that those smaller towns are now subject to such heavy taxation that they could not bear more?—I am taking a typical town. I say it applies to towns generally. I find country towns generally getting into decay; there are very many dilapidated and tumble-down houses, and that does not look as if they could bear much taxation.

1949. Do you mean such towns as Charleville and Mallow in Cork, and Kilmallock in the neighbourhood of Limerick?—I am not well acquainted with Charleville. That is rather a good town. I think there is a great deal of dilapidation in Kilmallock. Cahoreeshill was nearly a ruin when I was there. I am afraid the taxing power of these country towns is not much.

1950. The Chairman.—Will you pass on to the next question.—“Should all land in river beds be made to contribute, whether directly benefited or not? If so, in what proportion?”—I think what I have said with regard to the towns in my experience applies to a good deal of the land also. I do not think they can bear much more taxation. On looking over Purcell's *Almanac*, I find that the extent of unenclosed areas in the county is increasing considerably. They are not able to collect the areas of the county cess as they were before, which indicates, I think, increased poverty on the part of many of the farmers, if there was any evidence wanting to that effect.

1951. If the occupiers of land not immediately affected by the flooding are too poor to pay taxation, surely the occupiers of these flooded lands are still poorer.—That is true; but if they pay 5s. an acre for their land, and they can manage to pay it, and if it will be by the drainage made worth 10s. or 15s. an acre, they can as easily pay the 10s. or 15s. an acre, because it is worth it, as they can the 5s. an acre, because you are not taxing them, you only give them a better article, and charge them better money for it.

1952. From your previous answers, that increase from 5s. to 15s. would take a long time to bring about?—Yes, on some of the land, no doubt. What I would propose with regard to that is that it would be desirable that the charge should be made as low as possible, and that the capital should not be paid off immediately, that time should be given before they should commence to pay the capital, and that it should be extended over a larger number of years. In that way they would be able to bear it.

1953. How many years do you recommend?—I should be inclined to make it a long period. I think it would be very desirable that the annual payment should be as low as possible. I know in that cheap loan made by the Government in 1880, owing to the fact of getting the thing so cheaply, a great many drained land who perhaps would not have thought of draining it at all. Cheapness gives a thing an impetus that nothing else can give it; and with regard to a project so full of good in the future to the climate and

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to the country, I think it is a pity that it should not get every necessary encouragement.

1894. Thirty-five years is the period at present. How long would you extend it to?—I would make it as long as possible. I think it would be desirable to make it very long.

1895. To what extent would you go?—Well, I would say twice thirty-five. If they were paying interest, and the capital were secured, there would not be any loss attending it. I think it would be a very desirable thing. I am quite sure that cheap money for works of that kind would give a great impetus, and it would be difficult to over-estimate the advantages that would finally accrue from such work.

1896. Mr. Barry.—Supposing the rateable value of a district (I am not talking of a drainage district, but a district of some size) is increased by the improvement of the land, do you think it would be reasonable that the whole district should bear some proportion of the cost of the works which have brought about the increased rateable value of the whole?—Yes, of course each portion of the land as was directly, or even indirectly benefited by it. For example, there is a great deal of land that could not be thoroughly drained until these arterial cuts were made. Of course these lands would be benefited, and should be taxed to some degree, but not to the same extent as the lands that are directly benefited.

1897. I have not made myself quite clear. What I meant was this: supposing you take a county, for the sake of argument, and the rateable value of the county is increased in some proportion by the drainage works, all the inhabitants of the county would gain some advantage by the increase of the rateable value?—I am afraid that would not be a very tangible thing. I think if you are to do that it should be a very small thing indeed.

1898. I admit it may not be a very large thing, but it is true, is it not?—No doubt, but it would be difficult to measure it. It is not a tangible thing.

1899. The Chairman.—I think in one of your former answers you have pretty well answered Question 9—whether you think an outside body "should take the initiative, or give special help in the formation of drainage districts?"—I think, where the local men would not do it, it would be very desirable.

1900. Then with regard to No. 10.—"What precautions, if any, should be taken to prevent drainage districts being formed in such a way as to injuriously affect other districts, either by the omission of areas which ought for physical reasons to be included with them, or by direct injury in the way of increased floods?"—Well, I take it that question would be dealt with nearly before; that is, that you might have in a certain district, say along the Shannon, or any other river, the occupiers of the land adjoining the upper waters whittling off a drainage, and they might be opposed by the men below, who would have some reasonable objection to a system that perhaps would bring floods on them, if there was not a provision made to carry away the excess of water that would follow upon the drainage.

1901. Then you would give the Drainage Board power to deal with the channels outside their district?—Certainly.

1902. That would lead me to this conclusion, that these Drainage Boards should be more extensive than the mere district to be improved?—I think so, generally; I think it would be better that you should take the whole thing collectively.

1903. Take the Shannon. It has been suggested that the whole of the Shannon should be divided into two or three districts, and that two or three Drainage Boards should deal with the entire Shannon from its

source to its outlet?—I think it would be better in a work of that magnitude that you should have more than one Board, for various reasons.

1904. But would you put the whole of the Shannon under one Board?—One part may interfere with another.

1905. The question is, would you embrace the entire Shannon in one Board?—I think that would be too large; there should be different local Boards.

1906. Now go on to the next question of the maintenance of Arterial Drainage Works. How could the present system be improved?—Well, I really am not familiar with the working of the maintenance system, but I think with regard to maintenance that is an additional reason, with regard to the previous question, why you should have these large areas. Because the maintenance should also be in the same way. If a part of a drainage scheme, for example, had been to deepen a river, and that was the upper part, before the lower part was deepened, you might have the upper part after it was deepened silted up before the deepening of the lower part had been carried out.

1907. It has been represented that, when these works are carried out, there is a liability in maintaining them. What changes would you think desirable to prevent the drainage district again falling into its natural state when the works had been carried out on the part of the Drainage Board?—I think the plan adopted for the repairing of the county roads a good one, and it would be well to give the same power over the contractor that the Grand Jury have over every contractor for the county roads; that is, when the contractor for the maintenance of the Drainage Works comes to do the work to the satisfaction of the inspector, the inspector can stop in and order the work to be done, and charge the contractor or his securities.

1908. Mr. Pies.—Then you would have a local surveyor over the drainage of the district, like a county road surveyor?—I certainly would have some one to inspect the district.

1909. The Chairman.—Have you any remarks to make upon the subject of navigation?—That is canal or river navigation?

1910. Yes?—I think it is very desirable that it should be maintained. It is a very inexpensive way of bringing bulky materials, such as manure, and carrying away the produce of farms. I think it would be desirable that that should be continued.

1911. But supposing the tolls are insufficient to keep up the maintenance of the navigation, would you propose to raise funds for the purpose?—With regard to that I would take the opinion of the district, subject, perhaps, to some controlling power, and if they saw from the advantages they derived that the tolls would be more than the advantages they derived, I do not see how you would be justified in forcing it upon them. I think the local bodies ought to be the men to judge of that.

1912. Supposing a district decides that it is advantageous to keep up a navigation?—Then I would let the district that would be benefited pay.

1913. You would impose taxation on that district?—According as they are benefited; because, of course, it makes a very material difference whether you are near the sides of the canal or far from it. The men closest to it ought to pay a higher rate than those further off.

1914. Still you would approve of the principle of taxation of the district to keep up navigation, supposing the district votes in favour of keeping it up?—Certainly.

1915. Then I think that exhausts the list of questions, unless you have any further observations to make?—Not any.

[The witness withdrew.]

Mr. James Stewart Kinoid, called in and examined.

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Mr. James  
Stewart  
Kinoid

1976. The Chairman.—You have had a list of these questions?—I have.

1977. Without taking you through the whole of the list, I believe you wish specially to give us some information upon the drainage of the Barrow?—Yes, I had given special attention to that, but there are some queries in this paper which I think you would like to hear me upon.

1978. Without taking the questions in their order, if you wish to answer any questions that are in this list, pray do so?—The first is on the indirect advantages of arterial drainage under the head "C." "Improved intercommunication by main roads and between farms." Now it seems to me that the improvement of main roads is not so very important a point as the main and minor river courses, which is more a matter of drainage. There are provisions for making roads by the county now in Ireland, which work very fairly.

1979. That is not quite the question. We, ourselves, observed roads flooded very much, and injured considerably in that way?—Oh, I did not understand the question in that way.

1980. Drainage improves intercommunication?—Of course it would, in flooded districts.

1981. Will you please state, are you an engineer?—No, I am not.

1982. Have you had any experience in these drainage questions?—Yes. I am a land agent, and I have had a good deal of experience in the practical working of Drainage Boards. I have been on them, and had to work them out.

1983. Mr. Pies.—What Drainage Boards have you had to do with?—The Douglas River; and I have had a good deal to say to other drainage districts.

1984. Where is the Douglas River?—It is not the Douglas connected with the Barrow; it is down in the county Carlow.

1985. Mr. Barry.—You have also given a good deal of attention to the question of the Barrow, I think?—Yes; I have.

1986. Mr. Pies.—Are you interested in estates in the immediate neighbourhood of the Barrow?—Yes. With regard to arterial drainage, there would be a great deal of difficulty hereafter in making these main drains unless provision is made by Act of Parliament. Up to a very recent date the influence of the landlords, where it was exerted, was generally sufficient to enable open drainage between the farms to be effected on the give and take principle by straightening and sinking the main rivers. Now that influence is to a great extent removed, and unless there is some provision by Act of Parliament, I think there would be a great difficulty in carrying it out. Many of the tenants will object.

1987. The Chairman.—You would make it compulsory then?—Compulsory as regards the main run of water through tenant's farms.

1988. Then would you enable the Drainage Board to take steps upon any land that might be in the district which may be necessary to effect a thorough drainage of the district?—Yes; to connect it. In fact, I would go beyond that; that only applies to cases where there is a Drainage Board. I think the general law ought to be strengthened by some summary jurisdiction by which a tenant who is injured would be able to get his outlet.

1989. Mr. Pies.—Through the land of a tenant on lower land?—Yes.

1990. The Chairman.—You would go to that extent even without a Drainage Board?—Even without a Drainage Board there should be some provision to prevent the stepping of the flow of water off a man's farm.

1991. How would you deal with the cost of that if the upper tenant desires to drain his land through the

lands of one immediately below him?—I think the tenant would have to pay the cost who is benefited in that case.

1992. It might benefit the lands of the other?—It might. Well, then, it comes to the question of a Drainage Board. If you improve the district there ought to be a Drainage Board, but there are cases in which a tenant would pay a considerable sum to get an outlet, and is not allowed to get it. In fact, in our constant daily practice for many years that has been one of the most important things we have had to do, and we have often found it a very difficult thing to carry out in the management of estates.

1993. Mr. Akerley.—That is, where an outlet exists?—Where there is a natural fall, and it is either imperfect or choked up—sometimes intentionally choked up—for making watering-places for cattle.

1994. The Chairman.—You would make that compulsory which is now done by arrangement between landlord and landlord, or landlord and tenant?—Yes.

1995. Mr. Pies.—To what authority would you give them an appeal—the Board of Works or the Land Commission?—I do not think either the Board of Works or the Land Commission a suitable tribunal for doing it. My idea is that the magistrates should have summary jurisdiction.

1996. Would you leave it to the magistrates to assess the payment that is to be made?—I do not think you could give a summary jurisdiction for assessment purposes. It must be at the cost of the tenant who wants it. It is only for these minor cases that I would adopt that plan.

1997. Let us suppose the case of two tenants, one lower than the other. The upper man wants to drain through the lower man, but in making the drain he also drains the lower man. Would you throw the whole cost upon the upper man, or would you allow him in any way to recoup part of the cost from the lower man, supposing he benefited the lower man by what he did?—I would give him a right of action. On the same principle, if a tenant neglects to make his fences, the law is, after giving him notice, you can make the boundary fence, and recover half the cost from the neighbouring tenant by a summary process.

1998. The Chairman.—And you would leave the assessment of the apportioned cost to the magistrates?—No. I would not go beyond the summary proceeding before the magistrates. I mentioned that it is generally only between two or three tenants, but if it goes beyond that, you must have a District Board.

1999. Would you leave it to the Petty Sessions or the Quarter Sessions?—The Petty Sessions. The Quarter Sessions are too expensive, unless a question of compensation arises.

2000. Have you any other remarks to make before you come to the special subject of the Barrow?—Question 4.—"What causes have prevented a more complete adoption of these Acts?" I do not know whether that is very important. The Act of 1842 is rather old, but the Act of 1863 was beginning to work fairly well. After a few years it began to work very well, and there were a great many districts formed, but the Land Act of 1870 checked it; it alarmed the landlords—it transferred all improvements, I may say, except those that the landlord could specifically prove, to the tenants, and a question immediately arose whether it did not transfer all drainage improvements to the tenants. They claimed to have paid for them all, and it frightened the landlords, and checked them forming districts. It required three-fourths of the owners of the district to form a district, and you could not get that majority after the Act of 1870. That checked it. Then an Act was passed soon afterwards, giving the tenant the right to raise money from the Government on very favourable

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terms for similar works, and that also tended to check it.

2001. *Mr. Pitt.*—Was not that for the thorough drainage of their farms, and not for arterial drainage?—It was. It was not for arterial drainage; but the principle was adopted, and the landlords said to their tenants, "We have not that paramount interest in these matters now that we had." The landlords were immediately on the passing of that Act deterred from making further improvements.

2002. *The Chairman.*—That was the second Act. That Act was passed in 1879?—I think so.

2003. What effect had the Land Act of 1881?—That Act takes nearly all interest in the land from the landlords.

2004. Then it further stopped the progress of the Act of 1863?—I think the progress of the Act of 1863 was stopped before the Act of 1881. I think it was the influence of the Act of 1870 that checked it.

2005. *Mr. Pitt.*—The Act of 1881 has settled the matter?—Quite so.

2006. So that no landlord would do it?—No landlord would do it, except so far as he himself was concerned in his own land, and he might take an interest as one of the public in the improvement of the district. I do not mean to say he would not take a very large interest. Many a man having property would, in the interests of his tenants, take a large interest, but not at all in the same point of view as he did before as the owner of the estate. He is no longer the owner.

2007. *Mr. Barry.*—Do you think that the revolutionary interest which the landlord has under the Act of 1881 is not of any very great value?—It is just the revolution that is taken away. If he had the revolution, I think the interest would be very good.

2008. But at the end of a term of years, is not the rent to be reassessed?—Oh no, it would not be, as regards the improvements. The tenant would claim those improvements.

2009. Then the landlord would have no interest at all in improving the drainage of the land?—If a drainage district was now formed, and the amount assessed, it would be of course assessed upon the tenants. They would pay it, and they would claim that they had paid for the work at the end of their term, and the landlord has no revolutionary interest whatever. If you could imagine the case of a landlord who himself applied to the Board of Works for certain drainage on a tenant's land, having paid instalments for twenty-two years, and at the end of that time looked forward to be recompensed by an increase of rent, I admit in that case he might have an interest, but such a thing does not occur now, and is not likely to.

2010. The reason I am asking the question is, that it has been suggested to me that the landlord has an interest in the improved value given to the land by the drainage. A witness yesterday gave us exactly opposite evidence—that, in his opinion, at the end of fifteen years there was great risk that the improvements paid for by the tenant would fall into the hands of the landlord when the rent came to be revised?—That was probably a tenant who gave that evidence.

2011. He may have been looking at it from a tenant's point of view?—I think there is no doubt about it that that is a mistaken notion. If the tenant is assessed for the instalments, he will be the owner of that improvement.

2012. Well, now, suppose a tenant has had his rent fixed under the court for the fifteen years term, and, subsequently to that being fixed, a drainage scheme were carried out, is there the means of imposing upon the tenant an increased rent in relation to that drainage scheme?—There is a provision in the Act of Parliament.

2013. Has the Act of 1881 made it impossible to impose upon the tenant a charge for drainage by his

landlord?—Independent of the Act of 1881 there is a provision in one of the Board of Works Acts of Parliament, by which you can get any improvement that is made by them assessed to the amount of its value on the tenant.

2014. Any improvement made by the landlord?—No, by the Board of Works Loans.

2015. That relates to thorough drainage of a farm, and not to arterial drainage?—It relates to arterial drainage also.

2016. *Mr. Alexander.*—Supposing a tenant has to pay a certain tax for the arterial drainage being carried out, and supposing at the end of a certain period the quality of his land is so very much improved that a larger rent ought to be levied upon that land, has the landlord the power to levy that rent?—Oh no; the landlord has no power. The landlord has power of appeal to the Commission at the end of fifteen years for reassessment of the rent. Then the argument would be that the tenant perhaps was recompensed by having his interest assessed at the amount of the instalment that he paid, and the landlord was entitled to any further improvement or unassumed increment, but I take it he would get nothing for that. The tenant practically now-a-days would get unassumed increment. I may be mistaken in that. There will be a nice argument fifteen years hence as to who is entitled to the unassumed increment of an improvement paid for by the tenant.

2017. *Mr. Barry.*—That improvement would be only partially paid for by the tenant?—No, entirely.

2018. No, because the instalments are spread over thirty-five years; only fifteen years out of thirty-five would have been paid for?—True; but so far as it was paid, the tenant would have paid it.

2019. *The Chairman.*—Still, as the man continued as tenant he would continue to reap the benefit?—Yes; but practically the point you put to me was as regards the landlord entering into these arrangements. The interest that he would have is so minute and so doubtful that no landlord would dream of entering into the arrangement except for some other object—farming his own land, or the general improvement of the district in which he lived, or something of that kind.

2020. *Mr. Barry.*—The matter crops up again further on in this paper, as to representation on the Board. Therefore you will see it is germane to the whole subject?—Yes.

2021. Will you kindly inform me, supposing at the end of fifteen years the tenant gives up his occupancy, and only fifteen years out of the thirty-five years rate has been paid, who will have to pay the remainder?—Now the landlord does.

2022. But under the recent Act at the end of fifteen years, who will then have to pay the remainder of the tax, supposing that the tenant does not go on with his holding?—It is a charge upon the land.

2023. Therefore the landlord would have to pay it?—Yes, the landlord would have to pay; whether it could be transferred to a new tenant or not I could not say.

2024. *The Chairman.*—If it was transferred by the old tenant to the new tenant, he would then have to pay?—Yes, it would follow on then to the new tenant.

2025. It might have been first of all taken possession of by the landlord?—Then he would be responsible.

2026. And he might let it afresh to the new tenant?—Then it would be included in the rent.

2027. Then it would be a question for agreement between the landlord and the new tenant?—Yes.

2028. Then the landlord would practically resume his old status?—Yes.

2029. That you think is very improbable?—It is a very rare case in Ireland up to the present; even with the great depreciation of landed property there

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is very little land that falls into the hands of the landlord.

2030. Then you probably agree with the opinion given here by one or two witnesses, that the landlord now is simply a mortgagee?—That is all, and a very unpleasant mortgage—a mortgagee with a risk of continual litigation with his tenant, instead of being on friendly terms. There is one point that did not seem to be clearly understood, which I ought perhaps to mention. It was always the case under the Drainage Acts that a leaseholder could be assessed his share of the assessment by the Board of Works for any improvement effected under those Drainage Acts.

2031. Mr. Barry.—Was it a thirty years' leaseholder?—Well, perhaps it might be a thirty years' leaseholder; but under a more recent Act which was passed ten or twelve years ago, the Board of Works obtained power to assess or arbitrate in case of an application to them as to the amount that a tenant from year to year should pay (it was before the Act of 1851), and they have in many cases arbitrated and decided what a tenant from year to year should pay for his proportion of the assessment by the landlord for Arterial Drainage Works.

2032. The Chairman.—Is not that the same Act you have previously alluded to, giving the tenant power to obtain loans?—I could not tell you that; some of the Board of Works officials would tell you exactly the Acts under which that is done. But the assessment is paid by the tenant to the landlord, and the landlord is responsible to the Board of Works for the whole of the instalments—that is the peculiarity of it.

2033. Mr. Pitt.—It is an increase of rent paid by the tenant to the landlord for the improvement that he has received?—Yes.

2034. That can now be done to a yearly tenant as well as to a leaseholder, but besides that the Board of Works have power to lend money direct to the tenant for a tenant's improvement?—Yes; I do not think it was the same Act; I think it was prior to that.

2035. Mr. Barry.—In the case of a drainage not answering expectations, what would be the position of a landlord at the end of fifteen years?—I myself have had several cases of a certain charge being made upon the landlord upon a particular farm, both in the case of a leaseholder and of a tenant from year to year. The tenant has declined to pay his proportion of the assessment; arbitration has gone to the Board of Works, and the Board of Works have decided that his farm was not improved to the extent to which the landlord has been assessed, and the tenant has only been obliged to pay the lesser amount.

2036. The Chairman.—And the landlord pays the remainder?—The landlord pays the remainder to the Board of Works.

2037. Mr. Stewart.—He is not released from paying the balance?—The landlord has to pay the balance, although the original assessment was made by the Board of Works, and was supposed to be on the principle that his estate had been improved to that extent. They go again into the whole question of the improvement of a particular farm, and reduce, if necessary, the assessment to the amount of improvement on that farm.

2038. Mr. Pitt.—Has the landlord the right of appeal against an assessment in a case in which the tenant's farm is more improved than the original estimate that the Board of Works intended?—I do not think so. I could not answer that question, but the Board of Works would not entertain for a moment any question of increasing the assessment beyond the amount paid by the landlord.

2039. Then the landlord takes the risk of the success of the scheme?—Yes; the landlord is responsible for the full amount.

2040. The Chairman.—He takes apparently the entire risk?—Yes. He may be supposed to have an

interest. If he goes into a loan for drainage of his estate, he may be supposed to have some benefit from the general improvement of the district. I do not think it is an unfair provision; at the same time, it is a very remarkable thing that they reduce in favour of the tenant their own assessment on that farm which they made against the landlord's good that particular farm: the landlord, therefore, has a considerable risk in such cases. Then No. 6—"Proposals that have been made"—(a) Charge to be direct on occupiers." In all future cases I think the charge must be on the occupiers.

2041. The Chairman.—That is the preliminary question to the next—that it would involve alteration; that if it is on the occupier, the occupier should have some vote on the Drainage Board?—Certainly he should. "(b) Drainage Board to be elected by occupiers as well as owners." Undoubtedly. That makes a very important point as to how you are to form your Drainage Board.

2042. What would you suggest?—In Ireland sometimes elections, if they are placed into the hands of too illiterate and inexperienced a class, are very apt to fall into the hands of outsiders who influence them. I know one or two cases of that kind which have been rather disastrous to the interests of the district; but I still think the occupier who has to pay the instalments should have a vote, and I would suggest it being guarded in this way—that no occupier under a certain valuation should have a vote.

2043. What limit would you place upon that qualification?—Well, I would say, if his valuation was £8 a year, or £10 a year, and he was directly interested. When I say directly interested, I mean that he would be charged under the present Act as a tenant whose land had been improved.

2044. You confine that remark to his having a vote in the election of members of the Drainage Board?—Yes, to his having a vote.

2045. Now, go a step further. It is quite proper, if the occupier has to pay the charge, that he should have the power of being on the Board; but what qualification would you attach to membership?—I have not considered that point. I think the qualification that is required for that is skill.

2046. But still you have the popular vote for those members. You may get an illiterate Board, or a Board quite ignorant of all drainage questions?—Yes; and therefore if you could make the qualification skill and knowledge, it would be very important.

2047. I am afraid we cannot have that. I am afraid it must come to a monetary qualification. What limit would you place upon the qualification for membership?—The only way to decide that is to consider what limit of rateable value would provide you with literate and skilled men.

2048. That is it?—I cannot say, in this country.

2049. Mr. Barry.—It has been suggested to us that £50 a year would be the qualification?—I am very much inclined to doubt it for that. I do not say that £50 would not provide you with a very respectable man, and perhaps £100 might exclude some respectable men, but £50 a year does not provide you with an educated man necessarily in this country.

2050. Mr. Pitt.—Would you give voting power in proportion to the contribution these people had to pay?—You mean a cumulative vote?

2051. Yes?—I do not think that is necessary in the case of individual votes. It is against the spirit of the age.

2052. Then you would give a man who is valued at £10 a year as much voting power as a man who is valued at £200 a year?—I will answer that question in this way: If you are going to give every man who is affected a vote, you ought to give a cumulative vote to those who have a large interest. If you confine the vote to those whose valuation is over £10 a year (who you may assume to be men of some experience), I think the cumulative vote might be avoided.

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2053. But in the initiation of one of these schemes, when it comes to a question of voting, to get your two-thirds majority, is not the voting in proportion to the area of land under the Act of 1863?—Yes, it is.

2064. Would you, in the initiation of a scheme hereafter, where you would give the voting power to the occupiers, work it in that same way?—I do not think it would be necessary, for this reason: At present it is the owner, and the owner may be the owner of an acre or 1000 acres, therefore it is very important to give him a cumulative vote, to have the area represented; but if you give the occupiers a vote, the occupiers are as comparatively small that it is hardly necessary to make it cumulative in that case. There is a sufficient number of occupiers, even if you cut out those under £10 a year, to make it a fairly representative Board, I think.

2055. But I am now speaking of the initiation of the scheme and the voting, as to whether they would have the scheme carried out at all or not, and not of the Board of Management?—That is a different thing.

2056. Mr. Barry.—Have you formed any idea as to the proportion of owners and occupiers that there should be on a Drainage Board?—No; I have not.

2057. Would you prefer a mixed Board?—I would prefer a mixed Board, but chiefly for the reason that one would like to keep owners (although there is some disposition now to get rid of them) interested in the prosperity of the land, even to the extent of giving them something more than their share of interest, if it was possible, in these matters. But otherwise, an owner, so far as he was an occupier, would have a vote; and if he is not an occupier, merely as a rent-charger, his interest is so very remote that, failing what I said before, one would hardly see why he should have any very large vote in the matter, especially if you do not assess him; but if he is an occupier, of course he has his vote as an occupier.

2058. It would come back to this,—that the charge is a charge upon the land, whoever occupies it?—Yes.

2059. And in the event of failure of the drainage to realize expectations, would it not be more than possible that the owner would have to be the occupier?—Yes; it is a remote contingency.

2060. But is there not also a risk that the charge would come back upon him, supposing the occupier pays the charge in the first instance, and the scheme turns out a failure, and is not really giving a return to the occupier for the charge that has been placed upon him; and at the end of the fifteen years he goes to get his rent readjusted by the court?—There is a very serious risk of that.

2061. Do you think there is a risk that the rent would be reduced?—Yes.

2062. And that the landlord would therefore suffer by this charge having been put upon the tenant?—Yes; that is another reason why the landlords should continue to have a voice in these matters. I think, certainly, the landlord would have the ultimate responsibility, in the event of the scheme becoming a failure.

2063. Mr. Stewart.—On the one hand, at the end of fifteen years, suppose the land has been improved by the drainage operations, and the farm is of greater value, the landlord does not derive benefit from that, because in all probability the tenant would still remain at the same rent?—Yes.

2064. But, on the other hand, if the scheme proves a failure, and there is a loss, then the landlord has to meet that loss?—Yes; and therefore the landlord should have a voice in the initiation of the scheme.

2065. Mr. Pies.—Both in the initiation and the management?—Yes; I think he had better have a voice in both.

2066. Mr. Barry.—Would you be disposed to extend that right to the landlord being represented by his agent?—I would. It has been always the custom in Ireland, and it has worked very well. The agents have generally been the working men in these matters.

All the Acts provide for that, even the Grand Jury Acts, and in many ways it has worked well.

2067. Mr. Pies.—Have you any view as to the majority that should decide whether a scheme was to be undertaken, or was not?—I think the present rule works pretty well—three-fourths, I think it is.

2068. The Chairman.—A bare majority in number, provided a third do not object?—If one-third in area do not object, is not it?

2069. The whole voting power would be in the occupiers?—I did consider it at one time fully when the Act of 1863 was passed, and I thought it was a very fair proposition.

2070. It was two-thirds in 1863, but that was amended in 1878. "In sub-section 5 of the 6th section of the said Act of 1863 the assents required shall be the assents of the proprietors of a moiety in value of the land in the proposed district, instead of the proprietors of two-thirds in value of such land; provided always that no provisional order shall be made under the provisions of this section in any case in which the proprietors of one-third part in value of such lands in the said district have, within six weeks after the lodging of the report of the Inspector, expressed in writing their dissent." It is a bare majority.—I was not aware of that alteration. I do not object to a bare majority. I think a majority ought to carry a matter of that kind.

2071. Mr. Barry.—By that Act 33 per cent. could stop it?—I do not think it is desirable that a third should stop it, but that is a very well-guarded clause. There must be a prompt appeal by a third within a very short time.

2072. The Chairman.—Within six weeks?—Yes; and it must be a very strong feeling that would put that vote on it. Practically, I do not think that has done any harm.

2073. You would not interfere with that provision?—I think not. I do not see any objection to it. I have not quite finished with the question as to how Drainage Boards were to be elected. The note I have made here is that rural occupiers directly affected should have a vote, owners a vote, and towns affected should have not an individual vote but a representative vote officially. Of course, if you give towns an individual vote they would swamp the rural districts, and they are only affected as regards their main outfall. They have their own drainage scheme to form for their own town, on which they have a proper vote. I would give them a collective vote—an official vote—through their Board, or Chairman, or Commissioners.

2074. Mr. Pies.—Would you make that proportionate to the contribution that they were to pay?—If you adopt the principle of a cumulative vote, a vote for every £10 of valuation.

2075. Their contribution would probably not be in direct proportion to their valuation?—That is a point I have not come to, but I think it should. Perhaps I am forestalling somewhat, but I think that the burthen should have also an official vote through the cess payers.

2076. The Chairman.—Although they might not be taxed?—Assuming them to be taxed, we have not come yet to what the area of contribution should be; but I think they should be taxed, and, if they are taxed, that they should have a vote.

2077. Mr. Barry.—You mean a vote for membership, not a vote on the Board?—A vote in electing the Board. I am now speaking of electing the Board. If they are taxed, I think they should have a vote. I strongly object to very small occupiers having a vote at all.

2078. To what limit, £8 or £10?—£8 or £10.

2079. Mr. Pies.—Is that both as to the initiation of the scheme and as to the subsequent management?—Both as to the initiation of the scheme and as to the electing of the Board of Management.

2080. The Chairman.—When a man is once on the Board, of course you cannot give other members of the Board a qualification. He is there elected, and what

ever his qualification may be, stands on an equality with every other member of the Board?—Quite so. Then I will take next No. 7.—“If drainage charges were imposed directly on occupiers of land, how should they be recovered?” It appears to me that the best way to collect these charges would be in a similar way as the county rate is now collected.

2081. And give them the same power to enforce payment?—The same power, through the barony case collector. It works so well in Ireland that it would be better to avail yourself of that machinery than to adopt any new one.

2082. Mr. Pies.—Does the machinery of the Board of Works for collecting the charges due to them work badly?—It would not answer in a case of this kind. Their machinery, as I understand it, is simply to issue notes to the payers, who are supposed to remit that money to a bank to their account. That would not work well in a rural district.

2083. How does it work now in relation to the advances they make to tenants for tenements' improvement?—Well, the sums that they collect are larger than would be collected under this, and they are only individual cases here and there. Whereas here is every occupier in a whole district contributing small sums every year, and after the works are paid for there is the maintenance rate to be contributed, perhaps a halfpenny in the pound. You could not collect that in any other way, except somewhat like the barony case collection, and you have a precedent. There is the case of the bridge rates. There is one county, and I am not sure that there are not two in Ireland, that have made important bridges across large rivers, and they have got Acts of Parliament to assess the rate upon a number of baronies, not merely the adjoining baronies, but upon half the county, and these rates are apportionable in that case between the landlord and the tenant. They sometimes only amount to 1-10th of 1d. in the pound, and they are simply added to the county rate, and collected in the same way as the county rate. They are called bridge rates. In the county Wexford there is one that has been going on for the last twenty years.

2084. Mr. Barry.—Would such a rate be payable over a portion of the city, or over the whole county?—Generally it is over baronies, and this is over a number of baronies called a bridge rate. I would collect it in the same way as bridge rates are collected in the county Wexford. We have two machineries for collecting local rates in Ireland. One is the poor rate, and the other the county rate. They are not generally the same collectors; but the county rate is somewhat similar to this, and I think the machinery for the county rate and the bridge rate, which is always collected with the county rate, is the proper machinery to collect this.

2085. Mr. Pies.—In the case of an existing Drainage Board, does the Drainage Board pay to the Board of Works the charge in bulk, and then charge it in detail on the contributors, or does the Board of Works charge direct to the contributors?—The Board of Works charge direct.

2086. Except for maintenance?—Except for maintenance.

2087. The Drainage Board collects the maintenance?—Yes.

2088. But the Board of Works collects the interest and sinking fund instalments direct from the owners?—Yes, not from the occupiers, but from the owners.

2089. Then, under your proposal, would you make the Drainage Board pay the charge to the Board of Works to be collected from the occupier in the same way as the county rate is collected?—That involves an amount of staff on behalf of the Drainage Board that they have not now. I should be very much inclined to make the Drainage Board collect the whole rate, and manage it entirely, and that they should have a much more important staff than they have now. They have no staff now, only an engineer. I should be inclined to let the Government look to the Drainage

Board, and make the Drainage Board responsible to them, and let them collect it just as the county authorities do.

2090. The Chairman.—Would not that considerably increase the expense of the Drainage Board?—It would, but it would increase the efficiency. One of the great difficulties we have to contend with now is that, after a Drainage Board is formed, they do no work whatever. They do not often meet, and it is difficult to get them to meet, and they do not maintain the river; whereas, if they had a staff, and the Board saw there was work to do, they would attend. There would be work to do in collecting the rates, looking after their collectors, and maintaining the rivers. At present the rivers that were made under the Board of Works, twenty, thirty, and thirty-five years ago, are going back to such an extent that they are almost useless in Ireland, and that is, I take it, owing to the fact of the Drainage Boards being non-existent after the work is done, and, even while the work is in progress, there is a very bad attendance on the part of the Board.

2091. Where they are not non-existent they are still non-efficient?—Non-efficient even where they are in existence. When I was a member of a Drainage Board many is the time I have gone from Dublin to Carlow to attend meetings there, and we could not get a quorum, although the members were all gentlemen resident locally in the county except myself, and I had no personal interest in the matter, but I was only agent for parties who had estates in the neighbourhood.

2092. Mr. Pies.—But if the Drainage Board employed the county collector to collect the payments due to them it would nearly be the cost of a commission paid to him. It would be no great cost to the Drainage Board?—There would be no expense—only the commission. It is important to form these local committees for looking after local works. We have too little of that in Ireland. We should prefer to do the work. At present everything is done by Government, or land agents, or people like that. There is no such thing as a Board, except the Poor Law Boards, and they are greatly wanting in real experience of public work. Therefore the point you ask me about I think I can answer strongly in the affirmative that I should make the Drainage Board responsible for the collection of the money, and the payment of the instalments to the Government.

2093. Mr. Barry.—Then that qualifies your answer that you would collect it in the way similar to the county rate?—I should leave it to the Board, but still that is my opinion that that is the best way to collect it. Practically if the Board are responsible they would choose their own way of collecting it. I suggest that plan to show you that there is no difficulty in the way of collecting it. It has been said it would be out of all question to charge the occupiers, because it could not be collected in small sums by the Government. It could be collected by the Government even in small sums, but it would be better to have it done through the Drainage Board.

2094. The Chairman.—You would leave the Drainage Board either to appoint their own executive or to employ the collector of the county rate?—Yes. In suggesting the county case collector, I merely point out a way in which it could be done; but whether the Drainage Board do it or not, the Government could get their money. I should much prefer to have it thrown on the Drainage Board to collect it in whatever way they thought best. Then No. 8.—“Area of contribution. Should charge be borne by towns in district; and if so, in what proportion?” I think the charge should be borne by towns in the district, and I think it should be in proportion to the valuation.

2095. Not in proportion to the benefit derived?—Perhaps I had better answer the next question at the same time.—“Should all land in river basin be made to contribute, whether directly benefited or not? If so, in what proportion?” Now, my opinion is, as strongly expressed in my evidence before the late Barrow River

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Commissioner, that the recommendation of the Duke of Richmond's Commission should be adopted, that the whole area of the watershed should contribute certain rates. The land benefited should contribute a rate in proportion to the benefit, and a further general rate should be contributed by the whole area, and that general rate should be a rateable sum on the valuation.

2096. Not two rates but one whole rate, and that the rate paid by the persons greatly benefited should be higher than that paid by those remotely benefited?—No, I would have two rates—a general rate and a local rate—on the drained lands.

2097. Mr. Abernethy.—One for the lands greatly benefited, and the other for lands indirectly benefited?—Both indirectly benefited and which contribute to the mischief—a very important point. Every acre of ground within a watershed contributes to the filling up of the river, and also requires the use of the river for the water that falls upon it and must pass off.

2098. In fact, they are all interested therefore in the maintenance of the river?—Yes; it is the maintenance of the waterway of the district.

2099. The Chairman.—To what authority would you depute the valuing of those rates, because you would have a difficulty in saying what should be the general rate for an entire district, and what should be the local rate?—The local rate is an improvement rate. There is no great difficulty about that, because that can be assessed by the Board of Works, or by any authority, according to the valuation, with an appeal to the Board of Works; but the general rate I think the Drainage Board should fix.

2100. Assume that you have to collect, say, £1000. To whom would you give the authority to apportion that £1000 as between the general rate and the local rate?—The fixing of the improvement rate or the local rate fixes the amount that can be got out of the lands that are improved, and the balance must come out of the general rate.

2101. Mr. Pitt.—But supposing the improvement of the lands was quite sufficient to pay the entire cost?—Then I should say that the general rate should not be much more than the maintenance, but even then I think some small rate should be contributed generally for relief. I would follow the report of the Duke of Richmond's Commission. It is very much to the point.

2102. Mr. Abernethy.—If levied upon the lands directly benefited altogether it is almost prohibitory; that is to say, they cannot bear the taxation?—In many cases they cannot; but Mr. Pitt suggests a case in which they could bear it, but even then I think some relief should be given by a general rate (though it would be very small) on the ground that they contribute to the injury, and that they should contribute to the maintenance of the waterway.

2103. Mr. Pitt.—To what authority would you leave the settlement of how the charge was to be distributed, between the occupiers of the land improved and the general improvement rate?—There is only one way you can do it. You fix the improvement rate and the balance comes out of the general rate; but, in the case of the improvement rate being sufficient to cover all, I think the Drainage Board would be the proper authority to assess the proportions.

2104. The Chairman.—The Drainage Board would be the parties more immediately benefited. They would probably try to put upon the general rate of the county at large the heaviest sum they could?—They would be a representative Board, and the towns and also the baronies should be officially represented on the Board.

2105. But of course the majority of the Board would consist of the local parties benefited by the drainage?—I think they ought to be the strongest on the Board.

2106. If they were the strongest they would natu-

ally strive to put the larger amount on the county?—Yes. You must have some appeal, though I do not like appeals.

2107. An appeal to Quarter Sessions?—No; Quarter Sessions would not do?—to the Board of Works. The Board of Works have done very well, and the popular cry against them is all moonshine. They have done splendid work in Ireland. Nothing could be better. Then the next question is that "It has been suggested that the Government should take the initiative or give special help in the formation of drainage districts." In answer to that, I would say that, unless in this country somebody official, or somebody of position, takes the initiative, I am afraid these schemes would never be carried out.

2108. They would never be originated, in fact?—No; they would never be originated. In former days, I may say, they were almost entirely originated by the landlords or their representatives. I should say that the Board of Works or some such authority should, in the first instance, mark out a district and take steps to ascertain whether it could be formed into a district, and whether the parties were willing to form it into a district. To enable them to do that, they should give information as to what it would cost. They could only do that by surveys, and therefore I should say the Board of Works are the proper people to make these surveys in districts in Ireland where they think it necessary for Drainage Boards to be formed, to strike out the district and take steps to find out whether the parties would form a district.

2109. You would leave the Board of Works to take the initiative whether it had been suggested by any one or more local residents or parties interested?—Perhaps we ought to put them in motion by petition or memorial.

2110. You must have some originating power?—Yes.

2111. You could not send the Board of Works all over the country to find out cases?—There is ample machinery to do so. They have all this information, but they would not like to be put in that position to have it said, Why did not you do this or that? I admit there should be some memorial to them from a district.

2112. A memorial from one or more inhabitants of the district?—Yes; or some small proportion of the parties interested in a district.

2113. Would not a memorial from one influential person be sufficient to set the Board of Works in motion?—Hardly, because it involves some expense to make plans. The cost of making plans and valuations for the Upper Barrow River must have been considerable.

2114. Assume that an individual residing in a district sees the necessity for a Drainage Board being formed, and he cannot get any one to support him; he communicates with the Board of Works; they would send down an engineer, and, if he recommended that it should be done, then the Board of Works should take the initiative?—Yes; that would be the natural way they would work. You were saying there should be some initiatory movement to put them in motion. If there is any initiatory movement, it should not be by one person, but it should be by some sensible proportion of the parties interested.

2115. Would it be sufficient if the lay said, on the receipt of a memorial from the district?—Quite sufficient.

2116. Without mentioning the number?—I think it would be quite sufficient.

2117. Mr. Barry.—It has been suggested to this Commission that such a memorial should be accompanied by a money deposit, which should be of a limited amount. Have you any view on that subject?—I do not think it ought to be. The only mistake the Board of Works, I think, have made in these matters has been this,—I am sure it has been forced on them by the Treasury,—that they have always required the preliminary expenses to be paid. The



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preliminary expenses, in the case of the Barrow River, have been paid two or three times over,—certainly twice,—and there is nothing done yet. The people are sick of it, and the only contribution I would ask for from the Government would be those preliminary expenses—a matter of £500 to £1500 if it is a large drainage district. It is a difficult thing to raise, as the Barrow proprietors were asked to do a few years ago, £750 in a district merely to get the report. They were bound to pay the expense of the report, and to lodge £750, which was the Board's estimate. The report cost something like £1200 or £1500, and they were written to for the balance after years of work, when they were getting sick of it, and the whole balance has not been paid yet. About forty years ago a similar thing was done, and I have the list of contributors to an application for a preliminary report from the Board of Works forty years old, in the Barrow River, and nothing is done yet.

2113. The suggestion made to us was, that it should be a limited sum,—I think £50,—not an unlimited amount?—That is to test the *bona fides*. That is a matter of discretion, but I do not think it is necessary.

2118. You would be against that?—I would. The *bona fides* is tested by the willingness of the parties signing the memorial to be taxed for the work. That is my answer to that. If it is only with the object of testing the *bona fides*, as I say, I think that is sufficiently tested by the fact of the signing of the memorial showing they are willing to be taxed.

2120. That would depend a little on the number of people signing the memorial?—The Board of Works must judge of that. They must send it back to be better signed. The Board of Works might easily ascertain the views of the district by issuing voting papers, which could be sent back, and these voting papers might state the views of the parties as to whether or not the scheme should go on, and also, if it should go on, the name of the trustees they would suggest. Then the next question is, "What precautions, if any, should be taken to prevent drainage districts being formed in such a way as to injuriously affect other districts, either by the omission of areas which ought for physical reasons to be included with them, or by direct injury in the way of increased floods." I think great precautions should be taken to prevent upper districts injuring low districts, and one of the difficulties of the Act of 1863 was that it made no such provision.

2121. The Chairman.—We have had evidence upon this to a very considerable extent, and some witnesses have proposed that, instead of the Drainage Board being confined to the particular district on certain rivers, the entire watershed should be included in one Board?—I am quite of that opinion in most cases.

2122. And that others—the Shannon, for instance, which is too large for one Board from its source to its outlet—should be divided into two or more Boards. Do you approve of that?—I would not say the entire watershed of a river, but the entire watershed that would have within itself a sufficient fall. Take the case of the Barrow. From Athy up is what is called the Upper Barrow; there is very nearly sufficient fall at Athy, by which the Upper Barrow River could be formed perhaps into a separate district; but it should be such a district as, in the opinion of skilled engineers of the Board of Works, would have a sufficient outfall.

2123. You perhaps could not give a better illustration of what is meant by many of the witnesses than the Barrow. Would you form into one Board the drainage districts of the Barrow above Athy?—Certainly.

2124. Not only the Barrow, but its tributaries?—The Barrow and its tributaries from Athy up. I am strongly opposed to forming separate districts of the Upper Barrow tributaries. It is a very flat district.

2125. Would you include the Lower Barrow in that

same Board?—That is a very nice question, whether that should be included or not; but I should certainly say that, if it is not included, there should be a Drainage Board for the Lower Barrow formed at the same time, and it should be arranged that they should work together.

2126. Do you see any strong objection to the whole of the Barrow, Upper and Lower, being in one Board?—I do not see any very strong objection to it.

2127. Then would it not be as well to avoid conflict of jurisdiction if possible?—I think there would be less conflict of jurisdiction than if there were two Boards, when there would be danger of conflict.

2128. Then, coming back to the original question, you would prefer seeing the entire Barrow River, both Upper and Lower, under one Board?—I hardly think I know sufficiently to say that. I should say there would be less conflict with one Board than with two, but they are such extremely different districts—characteristically different—that it is a question I should not like to answer, as to whether there should be two Boards or only one; but they certainly should work harmoniously together, and the Upper should not be allowed to work away without the Lower being able to criticize their proposals.

2129. Mr. Abernethy.—On general principles, would you recommend that the whole drainage area and its outlet should be under one Board?—Certainly—that is the principle that I should adopt. We have a case somewhat similar with regard to the Inny River. The Lower Inny, as it was called, was sunk thirty-five years ago, under the Board of Works and the old Act of 1843. The Drainage Board ceased to exist, or, if it even nominally existed, it ceased to act. During the last thirty-five years the river gradually silted up. It is a very fast river, flowing into one of the lakes of the Shannon. About five years ago a new Drainage Board was formed for the Upper Inny. They did their work, and they found, when the work was done, that the outfall through this Lower Inny was ineffective, although the plans were made originally for the purpose of giving sufficient outfall for the whole district. Owing to the silting up of the river, it is at the present moment throwing back-water on the Upper Inny River. There is no proper machinery for the upper district getting at the lower district. They have no control over it. The only way they can get at it is by an appeal to the Board of Works, to make use of their powers, whatever they may be, to insist upon a Drainage Board being formed for the Lower Inny and doing this work. I understand that they can do that, but it is under an old Act of Parliament, and it is not very workable.

2130. The Chairman.—I gather from that, that is a further illustration of your approval of a considerable watershed district being under one Board?—Yes, certainly, as large as possible, so as to get the outfall complete.

2131. Mr. Barry.—At the present time there are very many minor Boards within the watershed of one river. What would you do with the minor Boards now existing?—In the Barrow River there are some.

2132. Mr. Pies.—Take the case of the Inny. What would you propose to have done in that case?—The Inny drainage is a simple case. I would simply make them form a Drainage Board and keep this work in order. The Board of Works have power to do it. It is a complete drainage district in itself, but it is not maintained.

2133. You say that, as a general principle, you would wish to have one Drainage Board for one river?—There you have two Drainage Boards complete.

2134. Could you in any way amalgamate them now?—For maintenance purposes, I think you could; but still I think the Lower Inny should first pay for their own neglect.

2135. That is simply a question of assessing the charge?—Yes. I think they could be amalgamated

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1306. I do not see why the Inny district should not have one Maintenance Board. It is not too large; but the Barrow is a very large one.

2136. The Chairman.—We will reserve the Barrow. —I do not feel quite competent to say whether the Barrow should be one district.

2137. Mr. Barry.—Would you follow that out a little more. In the case of watersheds where there are several Boards now in existence, having done their work and now maintaining their work, what would you suggest in the way of future legislation as to there being one central Board for the whole watershed?—Well, my suggestion with reference to the whole watershed was, that every acre within the watershed should contribute to the outfall, and therefore a Drainage Board in existence would contribute the same as any other acre or district towards the general rate. And it would have a representation on the Maintenance Board; but I should not charge it any improvement rate. It already pays its improvement rate to the Board of Works.

2138. Would your suggestion be, that there should be a controlling Board representing the whole watershed of the river?—Certainly, the Drainage Board.

2139. And that the minor Boards should be to some extent under the control of the principal Board?—To some extent, but they should first sink their own river. I do not see why they should be done away with. It might be found desirable ultimately, after the works were done, to make it into one Maintenance Board. I think very likely it would take, for instance, the Inny. That work is done. The Lower Inny should be put in order, and one Maintenance Board should be made for the whole district.

2140. Mr. Pitt.—There happens in the case of the Inny to be two subsidiary Boards as well—one that runs into the Inny?—Yes. It is only a question of maintenance rate there.

2141. Could not the larger Board afford to have a better officer and a better system for looking after the work?—Certainly. That is one of the main points. Make it a far more substantial working Board than any that exist now.

2142. Mr. Barry.—Would it not make it much more easy to collect the rates?—It would.

2143. Less expensive?—Less expensive, and altogether smoother to work.

2144. Mr. Pitt.—Would you give any central authority any power of control over these Boards?—I may say, before I answer that question, that if you recommend the suggestion of the Duke of Richmond's Commission to be adopted, of forming a larger area of district, it becomes still more important to have a large

representative Board for the whole watershed. Whether the whole watershed is to be the entire river to the sea or not, is a question of whether there is a good outfall for any part of the district.

2145. Mr. Barry.—I wanted to get your view as to the desirability of keeping alive the minor Boards, with regard to the special drainages in which they specially are interested?—At the present stage I should not like to override them. They probably have done their work well, but, when the whole work is done, then a general Maintenance Board should be formed.

2146. Mr. Pitt.—As soon as it becomes merely a question of maintenance?—Yes, and of collecting the rates.

2147. The Chairman.—The only other question remaining is the question of navigation?—I do not say anything as to that.

2148. Mr. Pitt.—One question with regard to the maintenance. We hear of the maintenance being neglected in a great many cases, and you tell us it is so?—Certainly.

2149. Would you give the Board of Works or the central authority the right of inspection, or would you only allow them to wait, as they now wait, till some one complains to them?—That is relative to the question as to the Maintenance of Arterial Drainage Works when complete.—(1) How could present system be improved? (2) Should there be more Government supervision; and if so, how should it be afforded?—I certainly think there ought to be a Government officer; a skilled engineer, working like an assessor; and that he should have both consultative and executive powers. He should be one of the Board, I think. The Government, having advanced the money, should certainly have a representative on the Board.

2150. The Chairman.—You would appoint this man as local surveyor over the entire district, with power to communicate with the Board of Works independent of his Board?—Yes; whether he should be merely local or not, he should have a very large control over the works.

2151. Practically he would be what we should term a county surveyor?—Something in the nature of a county surveyor, but not the county surveyor. He should be a colleague of their own, and I think he would be a very important colleague. He should be one of the Board themselves, and not their officer.

2152. You might call him possibly County Drainage Surveyor?—Yes. He should be, I think, a skilled assessor on the Board, having a seat on the Board, and they would have their surveyor besides.

[The witness withdrew.]

Mr. Robert Morrow called in and examined.

Mr. Robert  
Morrow.

2153. The Chairman.—Where do you reside?—Glarryford, County Antrim.

2154. What are you?—I am a farmer.

2155. I believe you want to give the Commission some information in respect to the particular district in which you are interested?—Yes.

2156. Perhaps you will kindly state your case?—Well, our case is as to about ten miles of the upper part of the river Main, extending from the rise of the river down as far as Denmaning Weir. That is about ten miles, to measure it according to the run of the river on the water, and seven miles in a direct line. That length includes three rivers or tributaries that flow into the river within a distance of about, I think, three or four miles, and a mile below the last river—that is the Clogh—there is a weir across the river Main that obstructs the flow of the water of all the three rivers, and it rises often and floods the whole area of six or eight miles, and is able to send it on a level back for six or eight miles to a depth of six feet sometimes.

2157. Mr. Barry.—What is the object of the weir?—It is to drive beetling engines in a cloth work.

2158. The Chairman.—Are there no sluices in the weir?—No, no sluices. That weir formerly was constructed of stones to a certain height. The owner of the mill went up to the farmers along both sides of the river, and asked them if they would allow him to put on a plank in the dry season for the purpose of accumulating more water to the mill. They agreed to that, on condition that he would only do it in the dry season. For a number of years it was done in that way, but gradually it was just let remain, and then finally it was fixed on—a plank of 11 inches. First it was only half-way across the water, and then gradually there was a second one nearly all the way across the river. The people did not know at the time to object to it—at least they did object, but did not follow it up, and it remained till there is a right now established, and now the millowner refuses to take it off at all. That flood covers over, I suppose, between

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3000 and 3000 acres of land in that distance of nine or ten miles.

2159. Mr. Barry.—Has anybody tried the right in a court of law?—I believe it has been tried, but not within my memory. My father says he remembers when it was tried, but somehow or other—I do not know what was the cause—it failed. I think it was about 1844 or 1845 that it was tried, or somewhere about that time. The people in the country think that there could be one good drainage scheme effected in that locality. There is part of the land arable; part of it is pasture land, and part of it is good for nothing,—a beast could not go on it at any season of the year.

2160. The Chairman.—How much of those 3000 acres was subject to flood before the additional height on the weir was fixed?—I could not exactly answer that—how much difference it would make. It would raise it a foot higher. Then the question is, how far it would extend more than it would have done formerly. I do not know that, but I know all the people along the river say that the flood is now far greater than what it was before the addition was put to it. It raises the river so much, that on our own farm not long since, and in one of the arable fields, it took away the owing barn from our plough, and swept them over the fences out of sight. That was this last year, and it was one of the driest we have had for a long time. We had eight acres of potatoes covered over a depth of some feet.

2161. Mr. Fin.—At what date was that?—It would be in the end of September or about.

2162. Mr. Barry.—What depth of water runs over the top of the board on the weir in flood time?—There would be a good depth in time of flood. You could not tell what depth, because it is rushing over like a cataract.

2163. A very considerable depth of water!—There must be.

2164. The Chairman.—What fall is there in the river in the highest flood—on the weir?—There is 14 feet in less than a mile. I suppose there is 5 or 6 feet—5 feet I am certain—at the weir.

2165. At the highest flood?—There is not a 5-feet fall-over. There is not a great depth over the weir. It could not get over.

2166. Mr. Fin.—What is the fall for the water-wheel?—I have an old report here which will give it. There are two mills, and the water is applied to turn three wheels, one of 14 feet diameter, one of 15 feet, and one of 14½ feet. There is 14 feet of fall at the upper one, and then the fall of the two other wheels is 5 feet. There is 19 feet of fall, and the two mills are within a short distance of each other.

2167. Are they ever stopped by back-water?—They are. Not the upper one, but I believe the lower one in a very large flood is stopped by back-water, but only in a very large flood.

2168. The Chairman.—But not the upper mill?—The upper one is not stopped by back-water.

2169. Mr. Barry.—Would you tell us the difference of level in the water above the weir and immediately below the weir in time of extreme flood?—I should think, then, it would be for about 5 paces below the weir up to the top of the weir, 5 feet or more.

2170. The level of the water?—I think about 5 feet, as far as I know. This does not give the height at the weir.

2171. I mean this—would the level of the water approaching the weir immediately above the weir be higher by some five feet than the water immediately below the weir?—In time of flood it would, and more, because there is a bank on each side of the weir—the land is elevated. There is a natural barrier there, and the weir is put on across this natural barrier that is on both sides. Thus the water cannot spread at the weir, but must shut itself back. For six miles it will level itself back. There are five or six feet, I am sure there must be. You can understand it when I have a mile above the weir, and our plough was

all covered over setting in the furrow, and the bars that you draw with were swept off, and we never saw them, and went over the fence of the field. It is at least five feet, I am sure, if not more. We can take a boat and go over the fences of our own fields, and that is a short distance above.

2172. You are giving the depth of water on your land. I want to know the difference of level of water immediately above and immediately below the weir in the highest flood?—There is 5 feet, I believe.

2173. I desire you would understand what I mean by this sketch. This is the surface of the water above the weir, and here is the weir. Then there is a board on the top of the weir. What is the difference in level between the water immediately above the weir and immediately below the weir in time of extreme flood?—I should say 5 or 6 feet.

2174. Then the weir is never drowned? The water never runs level over the top of the weir in time of extreme flood?—No. There is top water over the weir during the time of flood.

2175. The Chairman.—You can always see the fall?—You will always see it, but it never levels itself. There is a great volume of water going over, and you will always see the height.

2176. Mr. Barry.—Have there been any attempts to put sluices into this weir?—Nothing further than asking leave from Mr. Patrick,—that is the owner,—but he never would grant any liberty at all.

2177. Who have asked to put sluices in the weir?—The farmers above. No later than the day before yesterday there was a deputation sent to ask him if he would allow it, but he would not allow anything to be done till he saw the scheme, and would not give us any information at all. He said he should say nothing. We asked leave to put what we call a sort of a self-acting affair that the pressure of water should put down in the time of flood, and right itself again, and not to put it lower than the level of his weir. He would not allow that either. He said he would do nothing.

2178. You offered to do that at your own expense?—I think the country would do it just above it if he would give liberty. It is getting worse every year. The drainage is improved in the upper lands again, and they have made thousands of miles of open drains in the mountains for the purpose of making the pasture fit to graze sheep on. That all rushes down at once, and it is far worse than what it used to be. It is really a terrible affair. This present year the corn was washed off the fields when it was in little lots stacked. It was taken away over the river, and set on the far side, and some was swept away, and we never saw it again, and it takes a depth of water to do that.

2179. Do you farm your own land?—I do.

2180. Has there been any effort to make a Drainage Board in this district?—Yes. There is a Committee formed now at the present time, and they have had three meetings concerning this.

2181. Mr. Fin.—Who are the landlords in the neighbourhood?—Mr. Montgomery of Belfast is one of them. The late Major Gray is on the other side, and a man called Gregg is another landlord, and a Mr. Moore and Mrs. Dunne.

2182. It is the landlords who formed the Board?—No, it is the occupiers of land. The landlords, I do not think, will have anything to do with it.

2183. The Chairman.—Then who is the Mr. Patrick you speak of?—He is the proprietor of that place where the mill is. He is a magistrate.

2184. Is he a landowner?—Yes, he is a landowner himself. He has lands beyond his own district, and has lands, I believe, in some of the southern counties as well.

2185. Mr. Barry.—Is the Drainage Committee contemplating carrying out works?—Yes; they thought if they could get a scheme carried out in any way they would try it.

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2185. Have you an engineer appointed?—No; there is no engineer appointed.

2187. Mr. Pim.—Have you been in communication with the Board of Works about the matter?—No. Mr. Lanyon was the only man that introduced this subject first, and he called them together in Mr. Corbett's office, a solicitor in Bellinamona; but the idea was that the Board of Works should take it up. They could not get the people all to be agreeable. Some would like a large scheme, and some a small one, and some no scheme at all, and they thought, if the Board of Works would take it up, they would carry out a scheme independent of those conflicting opinions about it.

2188. The Chairman.—Has the Board of Works sent any one down to examine it?—No.

2189. Have they been solicited to do so?—They have not applied to them to send any one yet. The Committee was only formed about a fortnight or three weeks ago. Mr. Patrick's mill at present is not working, and the one below is not working. The man that had rented the mill has given it up—it was not paying.

2190. Mr. Pim.—Mr. Patrick is only headford of the mill?—Yes, Mr. Patrick is landlord of the mill, but he used to work the mill, and his father too. It was his father who fixed this plank on, and made it a fixed affair.

2191. The Chairman.—Have you no legal remedy against it?—I do not think so.

2192. Mr. Abernethy.—It has been tried?—It was tried at some time, and I believe it was the Board of Works that tried it. They were forming a scheme at the time when this report of Mr. Roberts that I have referred to was got up.

2193. The Chairman.—What is that paper you are referring to? It seems to be an ancient document?—This is Mr. Roberts' report, and nothing could give a better description of it than that. It is just as if you were on the spot and saw it. [Some assented.]

2194. Mr. Abernethy.—Is your farm a large one?—It is 106 acres.

2195. Amble land and pasture?—It is both. There is too little amble land and too much pasture, and we cannot go any further down on the pasture land, because it is flooded, and we must go on continually on the same land to cultivate. There are different farms, where I believe that two-thirds is grazing land; but some are more than that. There is one, I know, that has not a fourth of amble.

2196. Mr. Pim.—How many acres of your farm are liable to floods?—Over 30 out of the 106.

2197. Mr. Barry.—Are you acquainted with the steps that are necessary to form a Drainage Board?—No, I cannot say that I am.

2198. Have you been advised that there is difficulty in the formation of a Drainage Board in your case?—There is no difficulty, I believe, in the whole affair, only the rights that Mr. Patrick has. That is the difficulty.

2199. Mr. Pim.—That is the question of expense?—Yes.

2200. You have to compensate him?—Exactly. The whole thing could be done easily if it were not for the claim he holds on it.

2201. The Chairman.—The taking away of this weir would relieve you entirely of this flood?—It would relieve the whole ten miles, not only of the flood, but it would sink the water. This would be useful for water drainage as well, and it would do more than take away the flood, because it would relieve another belt of land outside the flooded land that is lying saturated with water, and there cannot be anything done with it. If the other was sunk, that could be improved.

2202. Mr. Barry.—If the water were kept to the summer level, would that be sufficient for the drainage of your land?—No, it would not. It would do a great deal of good, because, if it was kept to the

summer level, we should not have so many deep floods. It would go away at once.

2203. Supposing the water were kept to the level of the top of the board, would that be sufficient to drain your land?—In some cases it would, and in others it would not. In the very low-lying districts it would not.

2204. Mr. Abernethy.—I understand you to say where the weir is the shores contract?—Yes, it gets narrower. From Glenshyed Bridge to down against the mill the Main narrows itself; there is a dead end there, and all the sediment that comes down from the mountains settles there, and it is narrowing the channel of the river. A man that lives at the place where the weir is says there is a part of it that is nearly two yards narrower—a second bank rising up in the river.

2205. Behind the weir?—Yes; there is no outlet.

2206. Mr. Pim.—How wide does it flood in flood time?—In some places some miles back—not all alike.

2207. Would the river be two miles wide when flooded?—In some places I should say it is so. There is one place where I am certain it is, where a little turn comes round a hollow, and it sends it back over so far.

2208. Mr. Barry.—Supposing it were possible to keep the water level with the top of the board at all times, would the mill be able to work?—Yes.

2209. Even in time of flood?—Yes; the mill has plenty of water when the water is level with the top of the board, but in a dry summer season it goes below that. They have not enough then.

2210. Supposing it were kept level with the top of the board, would the mill work in time of flood, or is it obstructed by back-water?—I do not think so. The upper mill would work at any time. I have heard that the mill lower down the stream, where there is only 5 feet of fall, is sometimes stopped by back-water. That is as far as I understand the thing myself. I have not been in and about the mill, but that is from what I could hear.

2211. Mr. Pim.—Is there a long tail race from the mill?—There is.

2212. Then there is a rapid river running alongside the tail race?—Over the weir there is a rapid river. This report proposes to take away the upper weir, and form another one halfway down, and turn the water into the tail race.

2213. Mr. Barry.—What is the soil of the bed of the river?—It is clay—only at the weir there is rock.

2214. Is there limestone rock?—No, just a black stone rock—no limestone.

2215. Is it a hard rock?—No, they say it is not hard. It is an open sort of rock. In the summer time the country used to quarry it. My father remembers that his father went and helped to quarry it where the weir is, to make an opening for the water.

2216. Mr. Pim.—Not for the stone?—No, to give space for the water to get away. The mills were able to work before this plank was put on the top, and surely they are able to work when they have 11 inches more water than they formerly had. They have any amount of water now in the summer season when the run is short, and if Mr. Patrick had allowed something to be put in there that could open itself in the time of flood, it would do an amount of good.

2217. Is he often stopped for want of water?—I believe every dry time, in the summer, he was for some weeks.

2218. The Chairman.—There has been no special application to the Board of Works to send down a surveyor?—No, nothing of the kind. There was an attempt made at one time to take the upper part of the water to Bellinamona. They commenced to cut, and the millowner took action against them at once.

2218. Where does Mr. Langon live?—In Belfast.  
 2219. What was the opinion of your Board as to the powers of this Commission when they deputed you to come before us?—They thought that you had power to remedy the grievance about the weir perhaps, or could get a law for that purpose. That was what they thought. They thought that that board was put on the weir, and that it was not just and equitable to put it on. They held that opinion still.

2221. I think it is right to tell you that our powers are simply to inquire into the system of drainage, and chiefly arterial drainage. This of course is a question of arterial drainage, but we have no power to take any steps to remedy any grievance. We can mention the case in a report as a typical case, but not more.—That is really what they think, that when Mr. Patrick put in that weir he had no power to do it, and therefore they think he has not the same claim, or ought not to have the same claim, on account of that. They have suffered now for years on account of that extra charge.

2222. We can merely mention the case. I do not think we can go beyond what I have stated. We can mention the case in our report, and it will be for the Government to take into consideration whether they should apply for Parliamentary power to remedy similar cases. Beyond that we cannot assist you.—I understand. Suppose you are making a scheme for

[The witness withdraws.]

[Adjourned for a short time.]

Mr. Robert Sanders called in and examined.

2226. The Chairman.—You reside at Charleville in the county Cork?—Yes.

2227. And I believe you are a civil engineer?—I have been educated as a civil engineer. I am mostly engaged in land agency business.

2228. You have a copy of this paper that I hold in my hand?—Yes.

2229. You have read these questions?—I have.

2230. I suppose your observations will be based upon these questions?—Yes.

2231. Then, without troubling you with the questions another, perhaps you will just go through this paper and add any remarks you may desire to make upon each head. The first question is the importance of arterial drainage in districts with which you are acquainted.—I consider it most important that an effective system of arterial drainage should be organized, so as to carry out and to maintain the drainage of the country. Much useful work has been done under present and former Acts of Parliament, yet the arterial drainage of most districts is far from complete, and, in the absence of any uniform system of maintenance, the works which have been carried out at great cost are in some cases becoming of little value to prevent floods, owing to the continual silting up of the river beds, and the destruction of the banks by action of water, trespass of cattle, &c. It is essential that facilities should be provided so far as possible by the deepening and improving of the existing watercourses, to provide for the reclamation of all reclaimable land, where a reasonable return for the outlay can be expected. The lands most liable to river floods are great alluvial flats, very fertile, and, after reclamation, very productive. County Limerick, and the north portion of County Cork, is the part of the country that I am best acquainted with. That is a very rich and very fertile country, and it is also very flat; it is a great limestone plain, and I think there is no portion of the country where arterial drainage is more desirable than in those counties.

2232. Have you any particular district in your mind, or any particular recommendation to make?—I have. I have considered principally the catchment area of the river Maigue in Limerick, and also the upper portion of the river Uobeg in the county Cork.

the whole river, from the Lough Neagh up, that would take in the lower part as well as the upper part.

2233. We are simply to inquire into the various drainage districts?—I understand that.

2234. If the solicitor you have mentioned considers that there are any facts or any statement he would like to bring before the Commission, in writing, or if he will come himself, we shall be glad to hear him.—I will convey that to him. He would understand, I suppose, all about the legal difficulty. There is no difficulty, I believe, but the one to deal with; because, if it was not for that weir, they would try at once to have a scheme brought forward. I do not see that I can give you any further information when you cannot do more than make inquiry. I have stated all I know about the upper part of the river, and there is just about, I think, 5000 acres from the weir up to the head end of the river, that would be benefited by the drainage to a large extent—that is, directly. They would be indirectly benefited further back to a larger area than that.

2235. Mr. Pies.—That they cannot now put through drainage into?—Yes. Then we are killed out with the frost there in spring, there is so much wet, and there is sickness and death attributed to the state of the land. It is unhealthy to live there.

The Maigue rises in the north portion of the county Cork; it is principally in Limerick.

2236. Will you now give your experience and views upon that particular drainage district?—I consider arterial drainage would give a good deal of employment to the labourers, and I think that is important. The labourers in my part of the country are very badly off for employment; they are not employed all the year round by the farmers, but very often for only three months of the year, and the rest of the year they are without employment. If arterial drainage works were carried out it would employ a good many labourers, and I think that would be an advantage which would reduce the poor rates of the district, which are at present very high.

2237. But will you explain what advantage it would be to the land, or the occupiers and owners of land, because it is one thing to start works for the purpose of giving employment to labourers, and it is quite another to put those men upon works that shall be recuperative and beneficial to the country at large?—Well, I think it can be shown that the works are beneficial, and that it will pay to reclaim these lands. But the other consideration is an additional reason for carrying out the works. I do not think it ought to be the main reason, because of course it would be simply throwing money away to employ a lot of labourers on works that would not be remunerative.

2238. Then if you will confine your remarks to the benefits that would accrue to the owners or occupiers of land, it will be desirable.—I am inclined to think that at least one twentieth of the whole catchment area of the Maigue is actually liable to floods, while a much larger area is continually saturated and incapable of being thorough drained in the absence of sufficient fall into the main courses. But perhaps I may first mention the principal tributaries of the Maigue. They are the Canage, the Morning Star, the Greenagh, the Tory Hill, and the Upper Maigue and Lough. Drainage Boards have been formed over the Upper Morning Star. There are two Drainage Boards on the Canage; there is a Drainage Board over the Greenagh, and one over Tory Hill.

2239. What is the extent of those two districts?—

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The Greenagh is a large district. I think it is about 42½ square miles.

2237. What area is subject to floods?—I think there are about 2500 acres subject to floods. However, works are in course of construction there.

2238. That is in one district?—Yes.

2239. And the other?—Then in the Camoge—there are two Drainage Boards over the Camoge. I happen to be a member of one of them,—that is, the Upper Camoge,—and that district extends for seven miles from Slinsilla-bridge, close to Camoge, as far as Knockency. The ruin basin above Slinsilla-bridge is about 47,000 statute acres. The length of the main river is seven miles of that portion, and the tributaries five miles. That work was carried out in the year 1873, at a cost of about £7000; and it was estimated that about 1300 statute acres would be relieved from floods.

2240. And they have been done?—Well, I think the works have not been very successful. There was not sufficient fall provided at Orange Bridge. It happens that the rock comes up there, and there was not sufficient depth provided to carry away the drainage of the district; and those works, I am sorry to say, have been a great failure.

2241. Was that bridge within the district of the Board?—The district went down to within 100 yards of the bridge.

2242. Not including the bridge?—Not including the bridge.

2243. Then you could not interfere with that?—No; the Board could not interfere with that.

2244. And was that the cause of the failure of the works?—I think that was the principal cause.

2245. If you had had any control of the river at the bridge, would you have remedied it?—Oh, it certainly should have been dealt with.

2246. Have you gone into the question of the cost of removing the obstruction at the bridge?—Our engineer over the works is of opinion that the cost would be rather considerable; a good deal of quarrying would have to be done—probably it would cost about £1000 or so.

2247. Supposing the works there had been under your control, would your Board be prepared to spend the money?—I do not think the proprietors see it all inclined to spend any more money upon it. The Board for a good many years have practically ceased to attend to the drainage of the district at all,—in fact, they do not meet now; and I believe their account at the bank is overdrawn, and they do not wish to raise a maintenance rate.

2248. Should it not have been foreseen, before the money was expended upon the particular area of the Drainage District, that this would be an obstruction?—I think so; I think that should have been foreseen.

2249. Whose fault was it that it was not?—Well, I do not know whether they went into a sufficient calculation of the possibility of floods, and so on.

2250. What do you recommend now?—I recommend that the whole of the river should be placed under the control of one Board,—in fact, I think that the drainage of the whole of the Maigue catchment area should be placed under the control of one Board, and this Board might appoint Committees or Boards under them, to look after the drainage of the tributaries.

2251. And would you advise that one surveyor be appointed to overlook the entire district?—I think so.

2252. From the source of the river down to its outlet?—From where the tidal waters end up to its source.

2253. Does the river run into tidal waters?—It does; it reaches the tidal waters close to Adare.

2254. And you propose that from the source to the outlet it should be under one Board and one surveyor?—Yes. In that district there is a good deal of very

useful work that could be carried out. A good deal of reclamation works could be carried out on the Camoge, and also on the Morning Star. There is a Drainage Board, of which I am a member, on the upper portion of the Morning Star,—that is, from Ballinsilla-bridge up to the source.

2255. Where is the outlet of the Morning Star?—Into the Maigue, near Athlacks.

2256. Would the district be too large, if it is a tributary to the Maigue, to have both streams under one Board?—Under the Board that would regulate the drainage of the Maigue?

2257. Yes.—Well, I think it might be under the control of that Board; but I think there should be a Sub-Board appointed over the Morning Star.

2258. Of course every part of the district would have its representative?—Yes; that might be sufficient.

2259. And one Board and the two streams under one supervision?—Yes. On the lower portion of the Morning Star, for which there is no Board, there is a great deal of improvement of land that might be carried out.

2260. To what extent?—I think about 9000 statute acres are liable to floods; but besides the amount of land that is liable to floods, there is a great deal more that could be improved. There is a great deal of land which is not liable to floods, but which is saturated, and cannot be thorough drained because, for thorough drainage, you must have at least 4 feet to provide for the outlet of the main drain.

2261. Then you have mentioned a third?—Yes, the Upper Maigue and the Lough.

2262. Would you propose that the Lough be also included in this single Board?—I think so. The Upper Maigue and the Lough would form one sub-district, and that should be under the control of its one Board. There might be some arrangement made, that some of the members of the Board should represent that district, and should attend to the drainage of that district; but I think that would form a sub-district.

2263. What would be the total area of the other districts, the Maigue, the Lough, and the Morning Star—what is the total drainage area of those three and the Camoge?—The drainage area of the Morning Star would be about 25,000 statute acres,—that is, above Athlacks. Then I fancy the Camoge would contain probably about 40,000 statute acres of catchment area. Then there is a Board over the Tory Hill, that is almost complete in itself. It is a very small area, only 6500 statute acres. Then the Greenagh is 27,500 acres. Then with regard to the Upper Maigue,—that is, from Bruse upwards, including the Lough,—the area is divided equally between the Lough and the Maigue. Perhaps I might mention that I have here a one-inch map of the whole district, and I marked out the catchment areas upon that. [The same was handed in.] There are some small districts that I have not included in the areas that I have given you; but they are not very important, and might be included in one Board.

2264. Altogether, it would be under 150,000 acres?—About 180,000 acres.

2265. And for that you propose to make one Board for the management of the whole?—Yes.

2266. Each district being represented on the Board, and with one surveyor to superintend the whole of the work?—Yes; I suppose one surveyor would be able to do the whole of the work. Of course, he would have assistance.

2267. That is your recommendation?—Yes. Then, as to the assesses that I consider have prevented the more general carrying out of our arterial drainage, I may certainly lay the apathy on the part of the proprietors. I think a great many of the proprietors do not care to trouble themselves about it.

2268. Why?—Well, some of them not being resident in the country, and not taking very much

interest in their property, do not value the importance of it.

2269. Has recent legislation, as regards land, any effect upon it?—That, certainly, has had an effect.

2270. Has it rendered the owners more apathetic?—Owners now are not inclined to form Drainage Boards, for the simple reason that it would be everything out of their pocket, and nothing in it; they could not expect to get any increase of rent from the tenant, and therefore, of course, it is natural that they should not care to do it now. Then, of course, another thing which, within the last seven years, has prevented the formation of Drainage Boards has been agitation. I think, a great many of the landlords not being able to get their rents from their tenants, they do not care to go to any expense about getting up these districts.

2271. What remedy would you propose,—that the occupiers should have the initiative?—I think the occupiers, being the persons principally benefited by such work, should contribute, at all events, the greater portion of the charge.

2272. And, consequently, have power to vote for the election of members of the Board?—I think I should do away with election altogether. I do not think it is of very much value.

2273. How would you have the Board appointed?—The suggestions that I would make for the formation of these drainage districts would be, that the Government should take the initiative in the formation of the district, first, by defining what area should constitute a district. I think that would be important, because it does not do to leave it entirely to this man and that man to say what should be a district. The district should be defined by the Board of Works.

2274. That is what you mean by the Government?

—Yes. Secondly, by nominating the members of the Board. Under the present Act, the first members of a Drainage Board are nominated by the Board of Works; they, of course, carry out the work, and then, subsequently, the electors are called together, every twelve months, to elect a new Board; and if they fail to attend and elect a new Board, the old Board continues in office. Well, as far as I can learn, the electors of many Boards never do come together to exercise their right of election. In the case of the Carrage Drainage Board, for a number of years the Board could not be got to come together at all. The secretary used to send out summonses frequently to bring the Board together, and they could not be got to attend.

2275. Can you give me any reason why they should so systematically fail to attend?—Well, some of them at that time were not interested in the drainage of the district at all; they had been members of the Board, as representing the property in the district; but they ceased to represent the property in the district, and then, of course, they did not trouble themselves about it. Some of them, also, when they found that the district had got into a bad state, did not at all care to come together for the purpose of taxing themselves.

2276. When you say, got into a bad state, what do you mean?—They had allowed the maintenance of the district to fall into a shocking state.

2277. Into its original state, in fact?—Yes. There is quite as much land flooded now as there was before the drainage was carried out. I was interested in some property in the district, and I directed the secretary to call a meeting of the electors, and he did; and we got two elections, after a great deal of trouble, to come in and elect a new Drainage Board. Well, those two elections could have put any men they chose upon the Board. If they had wished to do it, they could have carried a job, but they were anxious to have the proper man representing the different estates in the district. But I think election is unnecessary. I would have the Board appointed by the Board of Works, or at least one member of it.

2278. Mr. Barry.—Do you think the occupiers

would take a keener interest, and attend the meetings more than the owners?—I do not think they would. I do not think the farmers recognise the importance of arterial drainage.

—2279. Do you think it would be satisfactory to the occupiers, as a class, if the Board was nominated by the Board of Works?—I think it would be more satisfactory than if they had the election of the Board, because they would mix up politics in it, and they would put in men who wanted to do something for their friends.

2280. Mr. Pin.—When you say more satisfactory, you mean they would get better value?—Yes.

2281. But it would not be so agreeable to their feelings, perhaps?—Well, as long as the work was well carried out, that would not matter. I think they would see that it was better to have proper men upon the Board, men appointed by the Board of Works, men who understood the question, than to have fellows there who knew nothing.

2282. The Chairman.—And do you think the Board of Works would undertake such a duty as that, because it would have to apply to the whole of Ireland?—I do not know whether the Board of Works would do it, or whether the Government would do it. I suppose, if it was the law of the land, the Board of Works would do it. Then, I think, the Board of Works should exercise more control over the execution of the works, and also over the future maintenance.

2283. Assuming that the Board continues to be elected by popular voice, in what way would you give the Board of Works power of supervision, more especially with the view to the maintenance of the works after their construction?—Well, if the Board was entirely elected by the occupying tenants, I am afraid it would be very difficult to give the Board of Works much control. They might have the appointment of the engineer; that would give them some control. Perhaps it would be well if they appointed some of the members of the Board, and others might be elected by the occupiers.

2284. Now, will you go on with your paper? Have you anything further to suggest?—I think the drainage district should be efficiently maintained, and a maintenance rate should be raised over the whole catchment area, and it should be collected with the county cess.

2285. The taxation should extend to the entire catchment area?—The taxation for maintenance.

2286. Not for construction?—Not for construction. I think that the principal charge for construction should fall upon those who are benefited by it.

2287. Why do you draw a distinction between construction and maintenance?—Because those people, who have the low marsh lands, come into possession of those lands as they were, and if you drain them, and do not charge them proportionately, you would be doing a great benefit to them at the expense of the general public.

2288. Would not that also apply to the maintenance?—No; because I think the maintenance of the district is quite as important as keeping up the roads.

2289. Why, how does the drainage of the lowlands affect the uplands?—The waters of the uplands coming down, the occupiers of the uplands are bound to provide towards the carrying off of those waters.

2290. Mr. Pin.—As regards the charge for the original cost of the work, how would you propose that it should be collected? you propose it should be direct upon the occupiers?—Yes.

2291. How would you collect it?—I should collect it in the same way that the drainage charges are collected under the land improvement clauses of the Land Act of 1881, through the Bank of Ireland.

2292. That is, the Board of Works would call it direct from the occupier?—Yes.

2293. You and originally in answer to Question No. 4 that you would have the Board of Works take the initiative in starting a scheme?—Yes.

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2294. Would you have them take the initiative without the people in the locality having applied to them in any way?—I should be in favour of a Maintenance Board or a Drainage Board.

2295. I think you have mistaken my question.—I should be in favour of a Board being appointed over every drainage district that would be constituted as such.

2296. I want to get at the first start, the original constitution of the Board. You have a river that requires drainage, and you say that the Board of Works should take the initiative. Should not some one put them in motion first in the locality?—No, I think there should be a Drainage Board appointed over every district where there is necessity.

2297. By the Board of Works?—Or by the Government.

2298. Do you think the Government should step in compulsorily and say, There is a river requiring drainage, and we will appoint a Board and have it drained; or should they wait until the people in the locality come and ask them to take the matter up?—I think they should appoint a Board over the district for the purpose of maintenance.

2299. But I want to get at the original construction?—I do not think the improvement of marsh lands should be carried out without the consent of the occupiers whose lands are to be improved.

2300. Then do you think the occupiers ought first to apply to the Board of Works to send down and have the place inspected?—I think so. I think the way it should be done would be this: A certain number of the occupiers sign a petition to the Board of Works to have a Drainage Board appointed; that the Board of Works should send down an inspector, and that they should then decide whether it is an advantage to the district that a Drainage Board should be appointed. Then there should be a scheme drawn out by the Board of Works something similar to the scheme for the erection of labourers' cottages.

2301. The Chairman.—Would you fix the number of persons who should sign that memorial to the Board of Works, or would you allow it simply as a memorial from one inhabitant?—I think there should be a certain number representing a certain amount of property in the district.

2302. Mr. Pies.—What majority of the occupiers in the neighbourhood would you allow to say whether the thing is to be carried out or not? At present it is left to the vote of the owners, and a certain majority can decide to have the work carried out; would you leave it to a bare majority of the occupiers?—I would.

2303. Would that be a majority in number, or would you give them votes in proportion to the size of their holdings?—I think in proportion to the size of their holdings.

2304. Then you would have the cumulative vote?—Yes.

2305. That would be similar to the position of affairs with the owners at present, it is in proportion to their value?—Yes. But I think it would be a very good thing if, upon a petition from a certain number, the Board of Works should consider the propriety of appointing a Board over the district for the purpose of maintenance. There is one river I do not think I mentioned, and that is the Obeg, from Bellevarut up. There is a large amount of land there that could be reclaimed.

2306. That is outside this district?—Yes, in another district.

2307. Mr. Barry.—Does that fall into the Blackwater?—It does. The catchment area of that district is about 45,000 statute acres. Not having made a special survey of the district, it is rather difficult to know how much land could be reclaimed, but I think an immense quantity. I think there would be at least 4000 or 5000 acres in that district that could be doubled in value and more than doubled in value.

2308. The Chairman.—I observe you generally use the word "reclaimed;" you mean improved? It is not

reclaiming the land in the sense that you recover it from a constant current of water, but you prevent the water remaining upon it?—Yes. The lands that I speak of as requiring reclamation are lands which are of some value at present.

2309. Then "improving" is the word, not "reclaiming"?—Yes, "improving" would be the better word.

2310. Relieving them of floods?—Yes.

2311. Mr. Abernethy.—By embankments, or how?—I think this district could be drained without embankments; I think there would be sufficient fall. There is one great obstruction at Bellevarut, and that is a mill; that mill would have to be purchased; and that is generally the difficulty in the formation of all these drainage districts. The same is true of the Upper Maigue at Buncro; there is a large mill and a weir. We were proposing, some years ago, to form a district there, and it would have been necessary to have gone to large expense in lowering the weir, lowering the mill-wheel and lowering the machinery.

2312. Mr. Barry.—Is there any power under the Drainage Acts to alter a mill and pay compensation without being obliged to purchase it?—I am not aware that there is.

2313. I mean compulsory powers.—Where you take away from the water power you can compensate the mill-owner without purchase.

2314. Mr. Pies.—How is the compensation decided? Does it go before a jury ultimately if the man does not agree?—It does.

2315. Have you any suggestion to make upon that subject of compensation and compulsory power of dealing with mills? It appears to be a great obstruction.—A great obstruction; many of those mills are not working, and of very little value to the owners, but when a drainage district is formed they at once begin to work them.

2316. Mr. Abernethy.—And the weirs are maintained although the mills are not working?—Yes.

2317. Mr. Barry.—Could you refer us to any portion of the Act where that power is given?—It is under the Lands Clauses Act.

2318. Is it your experience that future difficulties are caused in drainage districts owing to deficient information in the first instance?—I think so.

2319. I suppose that is rather a matter of expense in the first place, and there is the difficulty in finding the money?—Yes. I think it would be well if the Board of Works controlled the appointment of the engineer over the district; because in the system as carried out now an engineer goes down, and he takes possession of the district; he gets one or two proprietors to take up the thing, and then he makes his plans for it, and of course his great idea is to try and carry out the thing. As long as he can carry out the work that is all he cares about.

2320. Do you think as a matter of custom the engineer finds the money for the preliminary surveys out of his own pocket?—Well, I think it is general for one or two of the proprietors who are principally interested in it to guarantee him a small sum for the cost of making a plan, and then of course he gets a percentage on the execution of the work afterwards if it is carried out, but if it is not carried out he only gets a small sum sufficient to pay his expenses.

2321. Mr. Pies.—When the occupiers are the persons to pay the charge, and, in fact, to have the control of the affair, do you think they would amongst themselves provide the money for the necessary preliminary services?—I do not think they would be likely to provide the money.

2322. Then you think that ought to be done by the Board of Works?—I think so. I think the Board of Works should appoint somebody to go down and make the plans for the district.

2323. The Chairman.—How would you propose the Board of Works should be reorganised. Supposing there is no Board formed, and certain preliminary expenses are incurred, do you propose the Board of Works



should bear that loss?—I think they should. I do not think it would be too much.

2324. Being for the national benefit?—For the national benefit.

2325. Mr. Barry.—But I suppose you would propose that, if the Board were afterwards formed, the expenses of the Board should be charged on the district?—Yes, charged on the district afterwards.

2326. Would not it cause the Board of Works to be very chary about taking the initiative, in the case of failure, in forming new Boards if they had to bear the expense?—I do not think the expense would be very considerable.

2327. Perhaps not; but, large or small, would not it be a deterrent element in the initiative steps being

taken?—But I would compel the Board of Works to do it if a certain number in a district petitioned them.

2328. But if a certain number in a district petitioned, would not it be fair that that certain number should take the responsibility of the preliminary expenses?—That would be all very well if you had large landowners to deal with; but when you have a lot of tenant farmers and men who have not got money to throw away in paying engineers, I think it is difficult. I do not know whether it could be thrown on some Local Board in the district, such as the Local Board of Guardians, but I do not think that would be advisable. I think the expense should fall upon the Board of Works.

[The witness withdraws.]

Mr. Nicholas G. Richardson

called in and examined

2329. The Chairman.—You are a land agent?—Yes.

2330. Where?—In the county Kilkenny and the county Roscommon.

2331. Have you seen a copy of this paper?—Yes.

2332. Without going through the form of question and reply, you can make your own remarks, and state to what extent they apply to our questions?—Of course arterial drainage is an absolute necessity in Ireland. There is no doubt about that. There is one great drawback to it, that the expense is so great that it will not pay; for the people who are directly benefited could not pay for it, in my opinion, in the majority of cases.

2333. Will you give me that statement more in detail. Do you mean that the expense of draining the land would be so great that the land itself would not repay the cost?—It would not in most cases.

2334. Can you tell me upon what commercial principle that land should be improved then?—Because the indirect advantages are very great; but the people who gain the indirect advantages are very unwilling to pay for them, particularly in this country.

2335. Then you mean the cost of it should be spread over the catchment basin of the whole district?—Yes; I think almost the State ought to come in. In former times the landowners might be called upon to pay for the indirect advantages; but I think landowners now may be put out of the question, and the occupiers are the sole parties who should pay for it,—and they would decidedly object to pay, except for the direct money gain they make.

2336. Mr. Fitz.—What are the indirect advantages that you anticipate?—Climate is one of very great importance, and then it also gives a facility for thorough drainage.

2337. But that is an advantage to the occupier in the immediate neighbourhood?—It is; but, as a rule, arterial drainage does not directly affect much the soil itself; it only gives facility for draining other districts some distance away.

2338. Would not you make a direct charge against these very people who are, in consequence of the arterial drainage being carried out, able to make the thorough drainage?—Yes; but under the future system this must be voided; and I think you will find the occupier who gets an indirect advantage will vote against it, and therefore it will be impossible to carry out arterial drainage under the present laws.

2339. Mr. Barry.—You think, then, the occupiers will not be sufficiently alive to their own interest?—I do not think they will. The landowners were a set of buffers in the past, but of course they are gone—they take no interest in it now as a rule.

2340. The Chairman.—Now, perhaps you will go on with your paper. In arable land of course that is an absolute necessity; in pasture land the summer floods are what do the mischief?—The winter floods do no mischief; in fact, they benefit the land. With regard to the indirect advantage on the climate, I do not believe the arterial drainage alone will improve

the climate. Some think it will; but I hardly think it, because the area that will be drained by the arterial drainage is such a small portion of the extent of land required to be drained, that it would have an imperceptible effect on the climate.

2341. If the whole district were drained it would?—Decidedly; but then you come on several millions of acres of bog; and as long as you have these millions of acres of bog undrained, I do not think the climate of Ireland can be improved to any appreciable extent.

2342. Then what would you suggest as the means for draining those millions of acres of bog?—Until somebody discovers a plan of making it profitable, they will remain undrained; and that plan has not been discovered yet.

2343. That was the tendency of my question?—Yes; there is only one thing—of course experiments might be made. There is one idea that I think perhaps might succeed, and that is ryegrass very freely upon bog land. Of course the grain is not much; but if it was grown as a soil crop, and turned into manure, it might succeed in that way; but that is of course only an experiment.

2344. Is not that a question for the occupiers?—Decidedly. The Monivea district in one I wish to refer to. This district was made before my time—I believe during the bad times in the famine year, and the Board of Works started it in several districts. They made pieces of it in various places, and left the other pieces unmade. The pieces unmade are worse now than ever; because the parts that have been made send the water now with a rush upon the more quickly.

2345. Then would you form a Drainage Board of the whole district?—We were very anxious to do it at one time, and there are a number of proprietors who are anxious still. I do not know whether your secretary received a letter from Mr. Humphreys, who is agent for some of the owners. Mr. French is agent for his brother, a large proprietor in the district, and Captain Blakey is a large proprietor—he is anxious to do it; and I am a proprietor in the district myself, part of my property was done, and the other part left undone.

2346. Do you know why it was left undone?—I do not know of my own personal knowledge. I have always heard that the money was squandered, and after a certain amount was spent they had to wind it up; they had not sufficient money to go on with the whole district. But this was done when I was a mere boy.

2347. 1846 or 1847?—It was after that—early in the fifties—so that I do not know it of my own knowledge; but there is a case where the Board of Works actually injured some of us, and some of us, of course, gained a considerable advantage. The part that was done on my property was greatly improved, and that has been all paid off since, but the other part was injured.

2348. Mr. Fitz.—There was only a proportion of the cost charged against you, I suppose?—That was all. I think the Government remitted some of it, and

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I think that ought to be done in every case. I think the Government now ought to assist in arterial drainage.

2549. The Chairman.—And make it a charge upon the land?—Make it a charge on a very, very large area. Another point I wish to refer to in this particular district is that trustees were appointed, and they were bound, of course, to keep this arterial drainage in repair; they never met for eighteen to twenty years. The largest proprietor was at the lower end of the river, and he objected to any money being expended; he wanted each proprietor to keep his own district in repair. I was at the top of the river, and Mr. French was immediately underneath me. He and I were thinking of getting our part done, but before doing so I consulted with Mr. Roberts of the Board of Works, and he told me that if we did our part by ourselves the result would be that any other proprietor could come in and present a memorial to the Board of Works and get the work done by the Board of Works, and those parties who had done their own division would have to pay *pro rata*, even though they had paid for it already out of their own pockets. So under the circumstances I objected to this; and then, finding the trustees would not act, I presented a memorial to the Board of Works to get the river done at about double the cost that we could have done it at ourselves.

2550. What made you come to the conclusion that the cost to the Board of Works was double what you could do it at?—There is always a greater expense. There are heavy expenses that we could have got over.

2551. You mean preliminary expenses?—Yes. But in all these cases I think there should be an inspector who would be bound to report to the Board of Works, and after a long interval, of say five years, the inspector should have power to call upon the trustees to do it, because this river would not have cost anything like what it did if it had been kept in repair for the former twenty years; but, having been neglected for twenty years, of course the expense is very great, and we are paying for that still. It is not paid off yet; the Board of Works lent us the money, payable in twelve years.

2552. Mr. Barry.—What is the amount of the cost of putting it in order?—I forget the exact amount, but I think it was close upon £1000. Then, with regard to Question No. 6, the charge should be direct on occupiers now, because landlords have no interest now where the land is in the hands of tenants. They have no possible interest in it; it is entirely for the benefit of the tenants now.

2553. The Chairman.—Then, of course, it would involve the occupiers being on the Board?—Decidedly.

2554. To the exclusion of the landowners?—Certainly; wherever they should be on the Board. I think taxation and representation should go together.

2555. How would you propose to have the Board elected, then?—Whoever had to pay; by the occupiers who have to pay.

2556. Would you attach any qualification to the vote, or would you leave it to the popular vote?—I think every one who has to pay.

2557. Without reference to the amount of his payment?—I think so.

2558. Mr. Barry.—Do you consider that the landowner has lost all interest in drainage?—I do. The majority of small landlords at least. Large landlords may wish to keep their estates, but the majority of small landlords will be only too glad to sell when they get the chance.

2559. The Chairman.—Would you attach a qualification to the membership of the Drainage Board?—I would, but not to the vote.

2560. To what extent?—Supposing a man had only three or four acres, I would exclude him; a man should have a substantial interest.

2561. That interest would be based upon assessment?—Yes.

2562. To what extent of assessment would you limit the qualification?—I never thought of that, but I would certainly limit it. I would exclude the very small ones.

2563. What would you call a small, and what would you call a large assessment?—A man who was paying, say £5 a year, I would call a large man; perhaps it ought to be less than that.

2564. You mean paying £5 a year?—Yes.

2565. But paying £5 a year would mean an assessment of what?—Well, that depends upon what it would come to; in some cases it might be 10s. an acre, sometimes 4s. or 5s. an acre.

2566. The gross sum of £5 might represent an assessment value of £50, or it might be less or more?—Yes.

2567. That is what I mean: to what extent of assessment would you limit the qualification? If you say £50 annual value, is in the £ will be £2, 10s.—Well, it would come to more than that very likely. I think it might be put upon a poor low valuation of £25 a year; he would be a substantial man.

2568. Then an assessment of £25 a year should be the qualification, you think?—Yes.

2569. Mr. Abernethy.—Will you explain in detail your reasons why you think the landlord has lost all interest in the land?—In the case of small landlords they will certainly sell their estates when they can get their tenants to buy, and then, of course, there is no reversion and no possession. They have no interest at all, and they cease absolutely to have any interest.

2570. What leads you to the conclusion that it would be best to sell; what has led them to that conclusion?—The great uncertainty in the collection of rents.

2571. Mr. Barry.—Supposing the drainage of the district is a failure, and the occupier pays his proportion of the rate for fifteen years, and then declines to go on with it, would not the land then fall into the landlord's?—It would.

2572. And he would have to pay in the future?—Certainly, in that case.

2573. Then would not be, to that extent at any rate, be interested in the success or failure of the drainage?—Of course, if he meant to hold his land, he would be interested in it. In the first place, he would not wish to see his tenants injured, because if his tenants were injured his chance of recovering his rents would be diminished. Of course, every landlord who intends to hold his land would take very great interest in it.

2574. Mr. Abernethy.—On the other hand, supposing at the termination of fifteen years owing to arterial drainage and thorough drainage the value of the farm is very much improved, when the tenant leaves it, will the landlord be able to levy an additional rent on the incoming tenant?—I doubt it very much; he must go before the Land Commission, and I think his chances of getting an increased rent are very small except in some exceptional cases.

2575. The Chairman.—Then you think his reversionary interest is very small?—Very small.

2576. Mr. Barry.—You think, therefore, he has more interest in preventing failure than in making a success?—I do.

2577. Before you leave the question of representation, would you propose a Board entirely of occupiers or a mixed Board?—It depends altogether upon whether the landlords are intending to remain in the country. If they contribute at all to the expenses, of course they should be on the Board and entitled to vote, but where they are not contributing to any of the expenses, I would not put them on.

2578. Would you debar them from serving, if they are elected?—No, I would not, but I think taxation and representation should go together; and the person who pays is the person who should have the interest in the management of the thing.

2579. But you occupier you would say that nobody should be on the Board who does not pay a substantial

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2381.—Exactly, in order to get men of sufficient intelligence.

2380. But you would allow him to be on the Board although he did not pay anything?—If he was elected, if he contributed anything at all towards it, he ought to.

2381. My question is, supposing he did not contribute anything?—Then you can only suppose, if he is remaining in the country, that he has the revision of a possible failure.

2382. The Chairman.—He might have influence in the district, and he might be supposed to be a suitable person to be on the Board?—Yes.

2383. You would leave the electors, however, to elect him, although he does not contribute to the expense?—I would.

2384. Mr. Barry.—Would you extend that privilege to his agent?—I suppose you must in Ireland.

2385. Mr. Abernethy.—In the case I put to you it amounts to this, if the farm is improved and the tenant seems to hold that farm at the end of fifteen years, it is very questionable whether the landlord would recover additional rent?—I think that is very doubtful.

2386. But it is quite certain he would have to pay for the taxation when the tenant leaves the farm—that burden he is certain to have to bear?—Certainly, if the drainage is a failure. Very likely the landlord must take up the farm himself, and then he becomes responsible.

2387. The Chairman.—As occupier?—As occupier.

2388. Do you farm any of your own land?—Not at present. I farmed for many years 500 acres. Then as to the recovery of those drainage charges, I think it ought to be by summary procedure.

2389. The same as the county cess?—Yes, poor rates; process before Petty Sessions without waiting to go before Quarter Sessions. There as to the area of contribution, I think you can hardly tax a man for his own advantage, for instance, benefit to himself, and things of that sort.

2390. Then you would simply tax the land benefited by the drainage?—Exactly, and if there are indirect advantages, or if it costs more, I think the State ought to come in. I think it is a fair charge for the State to bear, because it is almost the same as the police rate or anything of that sort.

2391. Have you any analogous case where the State comes in under such circumstances?—At the Sack, I believe they are contributing towards it. There is a district started at present.

2392. Mr. Barry.—I think not?—I was under that impression.

2393. Mr. Finn.—They are lending money?—I thought they gave it—I think they might very fairly give it for a thing like arterial drainage.

2394. Mr. Barry.—What you suggest is that they should give the balance over and above the improvement to the land?—Yes. That is what I mean by giving special help. Then there is another thing: there is no doubt that where a district drainage is made, unless there is some precaution taken as to the outlet, the land below is very likely to be flooded.

2395. Mr. Finn.—Then do you think there ought to be some supervision on the part of the Board of Works both of the original construction and maintenance of these works, to see that all parts of the river are properly dealt with?—Decidedly.

2396. Mr. Abernethy.—And if a farm is drained some distance from the outlet, they should have the power of carrying this drainage system down to the outlet through the lands immediately adjoining it?—Decidedly; compensating the owner for any injury which it might do him, and paying for the work. In this Monivea drainage district the original work was to have gone through Lord Donnell's property. It was not done originally; he afterwards did it at his own expense, and the result of it is that the part of my property which was left unworked has been seriously flooded in consequence.

2397. Mr. Finn.—He has let water down on top of you?—Yes. I wanted the tenant, who have the land (it is all in the hands of tenants), to join me in removing the obstacles; but it was in 1879 and 1880, and I think they were unwilling to have their farms improved with the view of legislation that was coming, and so they refused point blank to assist me; and they were quite right, I think, for one of them got his rent reduced exorbitantly. The next question is navigation. The navigation is a thing that I really know very little about, except that certainly I think water carriage in Ireland is a very trifling thing, and brings in a very small profit, and is very inferior in other ways; it keeps the land waterlogged. One of the most extensive canals we have in Ireland is the one from Dublin to Ballinacree, and that is in the possession of a railway company, so that I do not see that there is any advantage in a canal under those conditions. I do not think canals are of much advantage in Ireland at present.

2398. The Chairman.—You would not advocate their extension, then?—No, not while you have railways.

2399. Mr. Finn.—With regard to the drainage districts that you speak of, you say in almost no case can they be drained for a price that would be chargeable against the land for the improvement of the land?—I am afraid not.

2400. Are you speaking in relation to the county Galway in that?—Yes.

2401. Is there any drainage scheme in the county Kilkenny?—No, the property I am interested in there is mountain property, at least it is hilly land, and there is no flooding.

2402. It all requires thorough drainage, but not arterial drainage?—No. With regard to that property, I was more anxious to give you some evidence about railways; but you are not going into that subject at present.

2403. Mr. Barry.—Not at present. Are you at all acquainted with the traffic on the navigation of the Lower Barrow in your connection with County Kilkenny?—No. The only thing is, I get Portland cement from Dublin to Carlow.

2404. By the canal?—Yes.

2405. Mr. Finn.—What is the difference in the charge from Dublin to Carlow by canal and by railway for that Portland cement?—I can find out for you, but I forget it now.

2406. But the canal is cheaper?—It is a little cheaper.

2407. The Chairman.—Perhaps you will furnish the secretary with those particulars with regard to the freight for cement and other articles from Dublin to Carlow?—I will do so.

2408. Mr. Finn.—Suppose in that particular case the canal was closed, do you think the railway charge for the cement would go up when the competition was removed?—That is very possible. But then, on the other hand, you must remember that in that particular district of the Barrow the injury that is done is something frightful. There is an enormous tract of country there very injuriously affected.

2409. Are you now speaking of the Lower Barrow?—Of Monastervenna and all that district.

2410. The Chairman.—You mean by the water being backed up in consequence of the navigation?—So I have been told.

2411. Mr. Finn.—Do you ever get coal carried?—Yes. I get that by rail, at about 9s. 9d. per ton.

2412. The Chairman.—What distance?—A few miles over fifty.

2413. Mr. Finn.—That is little over a penny per ton per mile?—Yes.

2414. Mr. Barry.—I think you said in the beginning of your examination that you thought winter floods were advantageous?—Yes.

2415. Have you had any experience which would justify you in being confident upon that point?—I have seen lands that have been flooded year after year

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by these winter floods,—callow meadows they call them,—and they always give splendid crops of hay.

2416. But have you been able to compare the same callow after drainage has been effected?—No; but I know in many cases it is a well-known fact in agriculture that there are what are called irrigated meadows, where people flood the meadows on purpose, by artificial irrigation, to get big crops.

2417. Mr. Pies.—That would be during the time the grass is growing?—In the winter also, and during the spring.

2418. What river is that flooded by?—It is up in Ulster in the county Antrim.

2419. Is it near the Blackwater?—It is no particular river; it is altogether artificial irrigation.

2420. Is there any particular deposit that comes from the river?—I do not think there is; it is close to Lurgan.

2421. It has been given in evidence here, that, although these floods may be beneficial where there are aquatic grasses in these callow meadows, when the floods are done away with the quality of the grasses changes for the better, and the lands become much more valuable?—You get finer grasses, no doubt, but you lose in bulk.

2422. Does that occur immediately after the drainage is done, or does the loss in bulk extend over a very long period?—I should be afraid of it; unless you can

insure these callow meadows by artificial means, either by mowing or bone manure. If you can do that, you will get the benefit of your drainage, but when you cannot do that, you get a heavy crop at no cost by leaving the meadows in their natural state. The other system, of course, is the improved system, and you get finer grasses, but then you must bring in the manure.

2423. Mr. Abernethy.—It is the material effect of the matter held in solution by the water that does it?—It is; it is, in fact, the same as top-dressing, almost anything you put upon grass land improves it.

2424. Mr. Barry.—Then, taking the whole subject into consideration, you think the winter floods are more advantageous than not?—I think so, but the summer flood brings a deposit that spoils the grass and the hay completely.

2425. The Chairman.—The loss to the crop in the summer more than counterbalances the benefit of the winter flood?—Certainly.

2426. Because you lose your year's crop altogether?—Yes; for instance, in the Suak I have seen where the hay has been made, and the flood has come down and carried off some of the crop altogether; and with regard to what was left on the land, the water was so high up in the cocks that it got rotted. I have seen the same also at Portliffington, Monasteran, and all that district that is flooded by the Barrow.

[Adjourned to to-morrow at half-past ten.]

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TWENTIETH DAY, SATURDAY, JANUARY 8th, 1887.

36 MERRION SQUARE, DUBLIN.

Commissioners present.—Sir JAMES ALARF (Chairman), JAMES ABERNETHY, Esq., J. W. BARRY, Esq., J. T. PIER, Esq.

Mr. James Stewart Kinross called in and further examined.

Mr. James  
Stewart  
Kinross.

The Witness.—With your consent I will confine my evidence to the three points that I have given attention to,—the extension of the area of taxation, the possible amount of taxation, and the terms of the problem that has to be solved, which I think have not been quite fully set out yet.

2427. Mr. Pies.—In special relation to the Barrow?—In special relation to the Barrow. Now, as to the question of the area of taxation, I gave evidence on that before the Barrow Commission. I was the only one, I think, that did fully enter into it, and I drew their attention to the evidence given before the Duke of Richmond's Commission; and the unanimous report of that Commission was that they strongly recommended that the area of taxation should be extended fully to the extent of the entire watershed of the river, and also to the towns situated on the river.

2428. The Chairman.—We know that the watershed of the Barrow extends over something like 407,000 acres. Do you mean you would extend it to the whole of that?—To the whole of that. The amount of improved land is only about a sixth of that; something like 45,000 acres, I think.

2429. Have you stated what is the proportion of the flooded lands, and partially flooded lands, and lands not at all flooded?—That is got out by a very careful survey and valuation made; skilled evidence has been given upon it, and it is about 45,000 acres of flooded lands that would be actually relieved from floods,—diminished by the works,—and the remainder of the land,—nine-tenths of it—simply contributes to the flood, but does not require to be relieved from floods.

2430. Mr. Barry.—When you say 45,000 acres,

you mean the flooded land and the land that would be improved?—Yes.

2431. Both together?—Yes, improved by drainage—the actual flooded lands and lands relieved to that extent that they could be thoroughly drained.

2432. The Chairman.—You say that appears in evidence. Was that before the Duke of Richmond's Commission?—No, before the Barrow River Commission, Lord Castletown's Commission. There is a most important record of evidence at the end of that report, with maps. It was before that Commission that I gave the evidence with regard to the extension of the area. Now in France they have an extended area of taxation. These matters have received much more attention there than in England. For many years it has been the custom to charge the taxation for the improvement works to prevent floods on the entire area; and in addition to that a large grant is made every year, and is included in the estimates to assist these works, and it is given out by the Ministers to the various districts as they may require it every year.

2433. Does that appear in any report in England?—No. But I made special inquiries myself through friends in France, and there is no doubt about it, that there is a large sum—several million francs—included in the Budget Estimates every year for this purpose.

2434. Are there Government returns in France showing what is done?—I never saw the returns, but I made special inquiries about it when I was over in France. I had seen the plans of these great barrages, as they are called, which they erect in the upper waters. They have a special school of engineers for the express purpose of devoting themselves to it. I made inquiries,

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and learned that there was a sum included in the Budget every year, of several million francs, and allocated to each district from year to year by the Ministers of the day.

2435. Mr. Barry.—Do you think that was for drainage entirely or drainage and navigation?—Neither; it is to prevent floods—for the control of the waters of the river.

2436. Mr. Pies.—Does that deal both with the upper lands and also with the lowlands?—It does. In France it is chiefly in the upper reaches of the river that the works have to be done. Here it is in the lower reaches of the river, but the same principle applies. Now in Ireland the system has been all through in all our drainage works to tax the lands actually improved, founded upon the principle adopted by the Board of Works that they would lend money to private individuals for the improvement of their lands. That has extended to a Drainage Board, which is merely an aggregate of people interested in lands which have to be improved, and they adopted then the principle of taxing the portion of these lands that have to be improved. They never went beyond that. In fact, there is no legal authority to this day for going beyond it; but in 1876 there were great floods in England, and the Government undertook to form a strong Commission. It was, in fact, a Committee of the House of Lords. The Duke of Richmond's Commission was formed, and the Marquis of Salisbury, Lord Ripon, Lord Courtenay, and some of the ablest peers were on it. They examined all the engineers of the river schemes in England, and all the most eminent engineers in England and in Ireland on the subject; and the report of that Commission is a most important one. Just in a few words the purport of it is here stated in a short letter that I wrote—"With regard to the principle of assessment, the Committee think there is no injustice in letting uplands for the maintenance of a channel to which they contribute their quota of waters, and that towns and houses should contribute to the rates in question. The Committee are therefore of opinion that the rates should be distributed over the whole area of a watershed, and that the taxation should be levied on the basis of the probable value." That is the purport of their report. The Government had pledged themselves to bring in a Bill founded upon the report of this important Commission. I was interested in the question, and got a copy of this report, and I remembered it when this Barrow Commission was formed, and drew their attention to it.

2437. The Chairman.—Do you know why the intention of the Government to bring in a Bill founded upon that report was not carried out?—I remember distinctly, some after time, the Government were pressed on that question,—why they did not bring in a Bill, and they apologized,—and said it was their full intention to do so, but time and opportunity failed them, and they could not do so. Time after time it was brought before their attention, but they never did bring in such a Bill. There are special difficulties in England with reference to bringing in such a Bill, because there are innumerable Acts of Parliament, not only affecting every river but several parts of rivers. In Ireland we have comparatively an easy task, because, except for those drainage districts, which really do not interfere with it, you have every river clear, I may say,—every district is clear,—and it could be applied to every district without doing anybody any harm. I do not know any country where it could be so easily applied as in Ireland. The Drainage Boards, of course, could be provided for without the smallest difficulty.

2438. Mr. Pies.—Would you recommend, in the case of the Barrow, what has been recommended by the Duke of Richmond's Commission as regards the spreading of taxation?—Yes, and I think there is the strongest possible argument which is set out in my evidence before the Barrow River Commission in favour of it. I recollectable really what was in the evidence before the Duke of Richmond's Commission,

that the upper lands contribute the water, but, more than that, they contribute the silt.

2439. The Chairman.—On what principle do you think that the Duke of Richmond's Commission adopted the uniform assessment of land throughout the entire district?—Because the rainfall is per acre, and the valuation is exactly in relation to the value of the acre.

2440. I was going to bring that out if I could. Of course the uplands are assessed at a much higher value than the lowlands?—No. If you did it per acre you would, but by doing it per valuation you do not.

2441. The lands must be of higher value where they are not flooded than where they are flooded?—The uplands include all the mountains, and the mountain tops are only valued at a shilling an acre.

2442. I was not alluding to that part, but as between the flooded land and the good upland?—With reference to that, the general assessment is intended to be according to the valuation of the land. Then there is another assessment on the lands that are to be improved—an improvement rate, in fact. That is clearly set out.

2443. Mr. Attorney.—And in Ireland the uplands are, generally speaking, of less value per acre than the lowlands?—Yes, as a general rule they are, in Ireland especially.

2444. Mr. Pies.—In what you have quoted from the report of the Duke of Richmond's Commission, it speaks of the cost of maintenance being spread. As regards the original outlay upon works, what was their recommendation?—I do not think they went into that question; but it is quite clear, with reference to the original outlay, that a very large proportion of that is accumulated maintenance; that is to say, that the silt that has to be removed is caused by the silting of the river—the region of the upper reaches of the river contributes more to the silting up of the river than the lowlands, because it is formed of loose gravel, and it sends down at heavy floods a very large amount of gravel and silt, which cause to a great extent those banks and irregularities in the river which have to be removed; and therefore the forcing of the new river course to a great extent is an accumulated amount of maintenance.

2445. Those accumulations in the bed of the river are an interference to a great water highway common to the uplands and lowlands?—Quite so. It is the great highway for the water belonging to the upper lands. They have a right to run their water there, but they have no right to let the silt accumulate there, and they are bound to assist in keeping it in order, the same as county proprietors are bound to keep the main roads in order, whether they use them or not in this country.

2446. Mr. Barry.—Is it your opinion that the General Assessment Rate should be called upon to provide the difference between the cost of the works and the improved value of the land which is now subject to flood, or that it should bear the whole cost of the works?—I think the improved land should bear the whole value of the improvement. They are willing to pay that. Where they object is when they have to pay more than the land is worth, which has been the rule in almost all drainage districts in Ireland, owing to the adoption of that principle that only the improved lands are to be assessed; and in almost every case of a drainage district in Ireland the improved lands are paying more than the value of the improvement to the land. The Upper Liffey drainage is a most important case in point, but there are others which I am not familiar with equally strong. The original estimate for the Upper Liffey drainage was somewhere about 2s. 6d. an acre. It is not good land. The present assessment, I think, is something like 5s. an acre, which is more than the improvement is worth—excessively more—double the value of the improvement. It is useless to some landholders, owing to the cost being so much greater than anticipated.

2447. Mr. Attorney.—It necessarily follows on the

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limited area of the land improved?—Yes. If the principle of general assessment in aid of that work had been the rule, there would have been a reasonable assessment.

2448. Mr. Barry.—Referring to the Barrow, I see that the improvement of the Great Barrow would cost as much as £34 an acre, and that the average cost would be £30, 11s. 3d.—That must be £34 an acre on the improved lands.

2449. On the improved lands of the Great Barrow alone?—The lands when improved would not be worth £34 an acre. I think I have now said enough about the area of taxation. The next point is the amount of taxation. The improved lands should undoubtedly be taxed to the entire amount of their improvement; then the deficiency would fall upon the unimproved lands within the area of the watershed. It is a matter that requires careful consideration how much could be put upon those lands, because in the Barrow river, according to the skilled evidence, the cost of the works would be so heavy, that the fund will be short; it will be difficult to raise the whole amount of the fund required, and therefore it is important to consider how much could be raised. Now from my own knowledge of the district, and the taxable power of the district, I should say that something like 6d. in the £ on the valuation all round, which is about, I think, 3d. an acre, is approximately the utmost that could be fairly assessed.

2450. The Chairman.—You mean on the whole catchment area?—On the whole catchment area, including the improved lands and the towns—6d. in the £ on the valuation. It would be hardly possible to carry any larger sum than that. At the same time I think that that could be fairly paid.

2451. That would be spread over a certain number of years to reduce the capital expended?—The principle in this country is that the Government lend the money, and it becomes capitalised in that way.

2452. Are you in favour of any extension of the time? At present it is thirty-five years.—In a case of this kind, where it is an important national work, I may almost say, perhaps the Government would consent to an extension. It would be very desirable if they would.

2453. To what extent should you recommend an extension?—The utmost that I have ever known a Government loan extended to is fifty years. It reduces the rate a little, but the amount that can be assessed on the improved lands, of which we have full evidence in the Barrow River Commission, is in round numbers £10,000 a year—£9000 a year on the improved lands, which is said to be a moderate valuation, and about £900 a year on the towns, if you apply that principle of assessment of 6d. in the £ on the valuation; that is £3600 a year. Then if you add 5 per cent.—and that might be added to Mr. Fitzgerald's valuation, according to his evidence,—that would bring it up to £10,000 a year. Therefore I think it may fairly be taken at about £10,000 a year—the assessment on the improved lands being the full value of the improvement effected in them. Now an assessment of 6d. in the £ on the valuation of the entire catchment would come, I think, to about £5380 a year.

2454. Mr. Barry.—I thought you said it was 6d. per acre—I merely stated what it would average, but that is on the valuation.

2455. Sixpence an acre would make £10,000 a year?—That is including mountains and bog, I think.

2456. Sixpence an acre on 607,000 acres is £10,000 a year—6d. an acre must be wrong?—Yes, it is 6d. in the £ on the valuation—an average of 8d. per acre.

2457. Mr. Pies.—Is your suggestion 6d. in the £ for the charge?—Yes, that amounts to £5380 a year; and that added to the £10,000 brings it up to £15,380 a year. Now we must deduct from that the amount of cost of maintenance year by year, because there will be no other rate available.

2458. The Chairman. Have you gone into the ques-

tion of maintenance?—I have not, but the engineers say that £2000 a year, or nearly that, should be reserved for maintenance.

2459. Is their estimate upon the proposed expenditure of some £300,000, as appears in the report?—It is, but in any case, no matter what sum is expended, the maintenance would be nearly the same.

2460. Have you considered the question of that expenditure of £300,000?—I have, and I will take that finally. Deducting £2000 a year from the £15,380 a year, leaves £13,380 a year, which is the amount you have available for taxation. Now to apply that to the scheme we have before us, the £13,380 a year capitalised would practically enable the Government to lend £300,000 and no more. It might be a trifle more if they extended the period, but very little more. Then we come to the terms of the problem you have before you. It is to sink the river for £300,000. I think too much stress has been laid upon the point by the engineers, as to what it would cost to relieve the entire district of every drop of water at the time of the greatest flood that could possibly occur, which means a succession of floods,—an unusual thing,—and in district after district which would continue the overflow for several weeks. They have made their plans very liberally, and their estimates to show how that could be done, and it amounts to over £500,000. We have not by any possible means that can be devised the power of raising £500,000 upon that district. The Chief Secretary has intimated that it is quite out of the question that be could not upon the suggestion put forward by the Barrow River Commission, that, inasmuch as they could raise £150,000 on the improved lands, the Government should give the difference, which is more than a quarter of a million; he has said that is quite out of the question, and that they have no funds for that purpose; but I think I have shown how £300,000 might be raised, and the problem is, what work can be done for £300,000? I think the engineers have not yet given their attention to that point, and have not stated to you what amount of relief that would give to the district, and whether it would be sufficient to relieve it from injury from floods, and, if I may use the word, the climatic injury to the district. Now it may be all very well to relieve a district from every drop of flood, so that nobody would ever suffer the slightest inconvenience from it by wetting the soles of their feet in going over the district; but that is not what you want. You want to relieve it from ordinary floods, and if an excess of flood falls once in five or six years, as appears by the evidence, that it should do as little damage as possible, and that the land should be eleven months out of the twelve practically dry for agricultural purposes. The question is, what sinking of the main river and subsidiary rivers, and what depth of cutting will effect that, and what will be the cost of that, and can it be done for £300,000 or thereabouts? That is a point that, in the whole of the Barrow Commission, the witnesses have never been asked, and they have never gone into it at all. Other engineers, who have not the facilities that the Board of Works' engineers has, of making surveys, have suggested that smaller works would do, but we have not got at all sufficiently accurate evidence what could be done for £300,000, and what amount of relief that would give, and if it would be such relief as would be satisfactory to the district. The impression in the district is that £300,000 would simply answer all the purposes, and if some of the flat lands were occasionally flooded for twenty-four hours or thirty-six hours, it would do them no very great harm.

2461. Mr. Pies.—The question of their being injured by flooding would depend on the time of the year?—Very much. There is only one time of the year when the floods of that extreme character would do serious injury, and that is in the autumn. In winter they do no harm, but perhaps good.

2462. Mr. Abernethy.—As to the great extent of the lands that you speak of, very slight embankments would even prevent them from being flooded in many cases!—Well, that involves the question whether embankments would answer. You must tell the engineers they are to make embankments as well, and make that part of the scheme.

2463. You know that in England—in Lincolnshire and Bedfordshire—and in Holland that is the system!—Yes; but the summer floods would not be of that extent to require embankments if the river were sunk; the only time when serious damage can be done is in the autumn, when the hay is being cut, or is actually out and stacked. Now that would very rarely occur to that extreme extent to do serious damage if the river were sunk, and if the water ran off within twenty-four hours the damage is very slight, but it is very important that, in addition to relieving the district from the floods rapidly and effectually, it should also lower the water so low that these lands practically could be thorough drained. I have had cases in Ireland where the water had been partially lowered and lands relieved from floods. There are cases on the Shannon at Portlanna, and other places, where the land has been relieved from floods, but the water is not sufficiently low to enable the lands to be thorough drained, and the result is that the lands continue to be mowed every year. They are not top-dressed yearly by these floods, which have a wonderful power of top-dressing the land; they cannot be filled and mowed; they cannot be grazed with cattle fed on them, and the result is that, in five or six years, they become almost valueless, though there is a heavy charge for drainage on them.

2464. Mr. Barry.—Are you at all acquainted with the drainage of Yorkshire and Lincolnshire, where the lowlands are drained by special lowland cuts, and the flood-water of the river is very often running 5 or 6 feet above the level of the lands between embankments?—Yes.

2465. The floods are excluded by embankments, and the land is drained by lowland drains, and the thorough drainage is there given to a depth of 3 or 4 feet?—I think, perhaps, you had better go into that with the engineers, because I am not sufficiently familiar with the system. I do not think it would be applicable to this district, as far as I could judge. It is a simple case of a river running through land, where portions of it are very flat.

2466. The Chairman.—Have any of the engineers that have studied this Barrow district considered a combination of improvement in the river bed and embankments suitably placed, not on the banks of the river, but some little distance back, so that there can be a considerable spread?—There is a great difficulty about embankments. I should be very glad if some

such scheme, which would economise money, could be adopted; but, in truth, embankments are not very effective here. You could lower the level of the water better. Small embankments in this country are not kept in order. The tenants will not keep them in order, and will not let you go on their land to keep them in order. If you had the river bed sunk, with a flood to superintend it and keep it sunk, you would have something done; but if you rely on small embankments, one gap would flood the whole country.

2467. But an Act of Parliament would enable you to go on to any land!—It might; but it is very difficult to keep up small embankments in this country.

2468. Mr. Abernethy.—Against that you will observe you have the maintenance of the river bed, and that requires constant dredging every year, where you have a large amount of debris brought down by the river floods?—You would have to maintain the embankments as well as the river, but in any case you must clear the river. I know there is a great difficulty in keeping small embankments in order in this country; and, as I say, one gap in the embankment will flood the whole country. Mr. Manning's evidence would be important on that point; but the engineers have never really given attention to what could be done for £300,000; what are the sections and estimates, and what would be the relief given for this amount which we can raise, and then to tell us if that will be satisfactory or not. I believe it would be sufficiently satisfactory for agricultural purposes; and sufficiently so to relieve the country from the terrible damp that exists all over it the whole year round.

2469. The Chairman.—You think that that disinclination to keep up the banks would be persevered in when the engineers say the great benefit they derived from the lands being kept constantly dry?—If you had a strong Board,—and it is a very important point to have strong Drainage Boards, because none of them are strong in Ireland at present, and they should be greatly strengthened,—with a sufficient staff, I think you might possibly effect it, but you have not the materials for a good embankment. The materials are very light and gravelly, the rabbits are very numerous in some parts, and the banks cannot be kept staunch. I find that difficultly practically, because I have the management of an estate, on which we have a large embankment, extending for a mile and a half to two miles, to maintain.

2470. Mr. Abernethy.—On the margin of the river?—Yes. There is a slight margin out off between the river and the embankment, chiefly owing to the irregularities of the river. We had to keep it a little. If the engineers are here to-day, I think they should be pressed on the point I have alluded to.

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Mr. James  
Manning  
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Mr. James  
Price

[The witness applied for, and obtained, the consent of the Commissioners to be pressed with the following evidence and asked.]

[Mr. Manning, Mr. Price, Mr. Hassard, Mr. Lewis, and Mr. Snyge were then called in.]

Mr. James Price further examined.

2471. The Chairman.—Before Mr. Manning proceeds to sum up his evidence, I should like to ask you if you have anything to add to the evidence you gave on the former occasion?—I have nothing to add but a paper which I sent, with some sections or areas of the Lower Barrow, to your secretary. I gave the dimensions of the river of the Lower Barrow for, I think, a length of 3½ miles,—average sections showing the discharges; and I also sent in a paper showing cross sections of the proposed embankments, and my mode of dealing with the work generally. I sent Mr. Abernethy that paper.

2472. Mr. Abernethy.—In your former evidence you stated that you thought certain sections of the river at least could be improved by embankment?—Yes; a great deal of them, accompanied by bank drains.

2473. That is, by constructing embankments of very moderate height,—not by the margin of the river, but a sufficient distance from the margin of the river,—to provide a sectional area for a flood-water channel?—Yes; and I showed generally all that and a section of the slide where the channel would be narrowed and constricted.

2474. You have also shown here embankments on the margin of the river?—Yes.

2475. What are the comparative advantages of the two systems—of an embankment on the margin of the river, and an embankment a sufficient distance from the margin, so that you would have but a small head of water against these embankments?—That would all depend on the circumstances to be determined as I went along; but, as far as I have gone, the embank-

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Mr. James  
Pryor.

month near the margin, 5 or 6 feet away, would give a sufficient section and a very small pressure—it may be, 2 or 3 feet only. I do not think it would be necessary to go very far out, so that you would not have to take much land.

2476. That is a question of sectional area?—That is a question of sectional area. I calculated that so that they would discharge the quantity of water, and I have shown the level of the flood-water on them.

2477. Mr. Barry.—Are you aware whether the soil is suitable for making basket?—I know there is plenty of very excellent clay for making bricks, and, to show what has been done, there has been a long embankment made, similar to what I propose, above Baylough Bridge, for about a couple of miles.

2478. The Chairman.—Has that been effectual?—Yes, it has. Of course no complete system of drainage has been carried out, but it has been effectual to a certain extent.

2479. Do you know how long that has been in existence?—It must be very old. There are trees and scrub growing on it; and I propose to plant all my embankments with scrub or oaks, or things of that kind.

2480. Does it appear to have received much damage from floods?—I did not see any signs of damage, and I have walked along it.

2481. Have you noticed whether it has been kept persistently in good repair?—I think it is in good repair. It does not show the slightest signs of breach—it is covered with thick grass and scrub, evidently a great many years old.

2482. Mr. Barry.—Do you see any niches or rabbit-holes?—No. There is plenty of clay in that district—in fact, the Athy bricks, which are well known, are made out of the purple clay in that district, and there is plenty of it.

2483. The Chairman.—Have you turned your attention to a combination (inasmuch as it seems almost impossible to expect £200,000 to be raised, which is the amount of the estimates of the engineers) of improvement of the river, and then embankments put sufficiently far from the margin of the river to take the volume of water at the highest floods?—That was the plan that I proposed—to combine the two. I have shown the gradients at the bottom in connection with these embankments.

2484. Have you made an estimate as to the cost?—It is a general estimate of £414,000. I gave that on the last occasion.

2485. You do not get below that?—No.

2486. Mr. Abernethy.—Was that for the whole river?—Yes. I do not touch the Lower Barrow at all.

2487. Then that is the river down to Athy?—Not below Athy at all. I do not consider it would be necessary. Then I should like to give in evidence this letter, which I wrote to the Secretary of the Commission:—"In reference to a question asked of me by the Royal Commissioners on Saturday last as to the insufficiency of the Lower Barrow to pass floods, on referring to my notes I find two marked examples of its insufficiency, namely: between Bagnalstown and Finscourt, a distance of  $2\frac{1}{2}$  miles, the average section of the river can only pass a flow of 174,000 cubic feet per minute; whereas the flow, if works are carried out as now proposed, would be 600,000 cubic feet per minute. Similarly, from Ballyallen Upper to Ballyallen Lower,  $1\frac{1}{2}$  miles, the average channel would only pass 530,000 cubic feet per minute; but future flow would be 625,000 cubic feet per minute. Hence my opinion on the great risk of increasing the flow in normal floods." It is insufficient at present.

2488. Mr. Barry.—Does your estimate include the cost of dealing with the tributaries?—Yes.

2489. All of them?—Yes; but not entirely by embankments.

2490. Of dealing with them?—Dealing with them all—a combination of the embankments and cuttings. I have given in that section a comparative estimate showing the quantity of earthwork is a cutting to

effect the same object as would be done by the embankment, and I have shown the comparative rate per mile of saving by that.

2491. May I ask what amount of data you had for forming the estimate—whether you had such an amount of data that you could make a trustworthy estimate of the whole operation?—Yes generally, but I could not say it was sufficient for a very accurate estimate, but I have worked on the published plans which were appended to the report of Mr. Manning on the previous enquiry.

2492. You have not taken any more sections or cross-sections of the river for the purpose of arriving at your estimate?—No. I have examined portions of it, but it would be too much detail to examine every part.

2493. Mr. Manning.—[to Mr. Pryor].—Do you propose to drain the lands of the Upper Barrow by your scheme of embankment?—I do—partly banks and partly cuttings.

2494. And therefore no floods will be retained on the lands, and the quantity of water at Athy would be precisely the same as if that object was effected by deepening?—No; because my plan consists of three parts in order to meet that matter—the effect of increasing the floods. I admit that if I had no retaining reservoir, the quantity of water sent down by my plan would be the same exactly as by your plan, but I proposed, in addition, to sacrifice 2000 acres of the flooded lands by embanking it round, and forming it into a reservoir, which would take a fourth part only of the flood for four days.

2495. Do you state, in your evidence, that those reservoirs are to be constructed for the purpose of providing for a discharge of 80,000 to 100,000 cubic feet, the amount by which you suppose the discharge of the Lower Barrow would be increased?—80,000 cubic feet per minute is what I fix upon for four days. I say there is no flood, except a very abnormal one, which would exceed that. That is a fourth part of the flood.

2496. Mr. Pryor.—What is the maximum amount of water you would propose, in your scheme, to pass through Athy?—240,000 cubic feet per minute, except in a very abnormal flood, when it would rise to 300,000.

2497. Mr. Barry.—You have stated that you can drain the land behind the embankments to a sufficient depth for cultivation; where will you have the efflux of the lowest one down the river?—I could show it on the map. I would have it just at the step, wherever I put the bottom of the slide I put in my efflux always there.

2498. Is it above or below Athy?—Above Athy.

2499. Can you tell us what the level of the flood line above the level of the land would be with embankments where the height would be greatest?—I do not think in any case it would rise more than from 2 to 5 feet. I have a certain number of 5-foot embankments and a certain number of 3-foot embankments, and, as far as I can see, 2 to 5 feet would be the highest it would ever rise against the embankments.

2500. Supposing the level of the river water is 3 feet above the level of the land immediately adjoining the spot under consideration, and you want to drain the land behind the embankment to a depth of 3 feet, the bottom of the lowland drain would have to be 6 feet below the flood line at the very least?—It would.

2501. And would that lowland drain have as outlet?—Below the next slide.

2502. Can you tell us how far that would be, supposing we take the position of the river just above Bart Bridge?—It might be 3, 4, or 5 miles farther down. It might be longer.

2503. Have you gone sufficiently into the proposal to be able to say precisely where those effluces would have to be?—I think I could mark them all on the map.

2504. Have you taken the levels?—No; I have gone by the levels on the published maps.

2505. Mr. Abernethy.—You state that the height of



the head of water would be 2 to 3 feet on these embankments?—Yes.

2506. That would be on the land between the embankments and the river edge?—Yes.

2507. How long would the floods generally be on the land—an ordinary flood?—An ordinary flood would be for months on the land in that district; other floods coming on before it has time entirely to run away with the bad channel. I should say for months together that land would be covered.

2508. Are you speaking of the river in its improved state?—No; I am speaking as it is now; in its improved state it would be only a few days.

2509. By a combination of removal of obstacles from the bed of the river, with embanking certain parts of the river in the way you have suggested, how long would the floods lie on the land 2 or 3 feet deep on the margin of the river?—I should say hardly a week.

2510. Would that very materially affect the lands

behind the embankments?—Not at all. It would be intercepted by a drain at a greater depth. It is quite usual to have a 6-foot difference of level between the water in a canal and in the back drains. There is no trouble at all or any difficulty from any leakage taking place.

2511. You would not require any very great care in the shape of clay puddling in constructing an embankment 4 or 5 feet high to stand the head of 2 or 3 feet?—No; any ordinary stuff rammed anovars like any dam. Properly put together, the ordinary stuff you take out of that country would make a good a dam as is required. There is no necessity for puddling at all; very few of our canal banks are, and I have had the charge of over 100 miles of canals, which are embanked for a considerable distance, for over twelve years, and hardly any of these banks are puddled even when of a greater height than that now proposed.

Mr. Richard Hassard further examined.

2512. The Chairman.—Do you wish to make an addition to your evidence?—I do. After the last meeting of the Commission at which I was examined, I sent a paper to the secretary asking the permission of the Commission to allow it to be taken as part of my evidence. It is but a short document, and with your permission I will read it.—“Dublin, December 6th, 1886. Dear Sir,—River Barrow drainage.—I shall feel obliged if the members of the Commission will allow me to supplement the evidence I gave on Saturday in the following particulars:—First, As to embanking the main channel, and draining the adjacent lowlands by back drains, relative to which some questions were asked by Mr. Abernethy. Although it is probable a more detailed examination of the entire area of flooded lands may show that there are some few instances in which such drains may be employed with advantage, I believe that, owing to the configuration of the ground and the absence of any sudden falls in the main river, which would admit of the water from the back drains being brought into its channel by gravitation, the relief to be obtained in this way would be of a partial nature only. This will, I think, be apparent from an inspection of the longitudinal section of the proposed new channels on the Great and Little Barrow rivers, on which my estimates are founded, and which I left with you for the information of the Commission.” It would entail either raising the river by means similar to the way in which the Lower Barrow has been raised for the purpose of navigation, or it would entail draining those lowlands by pumps. There would be no means of getting the water from the lowlands into the river unless an artificial fall is created.

2513. Mr. Abernethy.—That is on account of the small fall in the river?—Yes; on account of the small fall.

2514. Do you know the rivers in Bedfordshire and Lincolnshire?—I know a great many of them.

2515. Do you know what the fall is per mile?—The river Witham and the rivers in the Fens I have some knowledge of.

2516. Do you recollect the fall per mile?—I do not recollect it.

2517. It is very small, is it not?—It is very small, no doubt; but then the lowlands are nearly all drained by sluicing into the sea or by pumping.

2518. That is not so in Lincolnshire, as far as I am aware?—The river Witham is, I think, done in that way.

2519. Do you think that the water lying on the land between the margin of the river and the embankment formed say 100 or 200 feet, as the case may be, from the margin of the river 2 to 3 feet deep for a period of a week would materially affect the lands outside the embankment?—It would prevent them being drained by gravitation until the flood fell.

2520. Would a head of 2 feet of water on that

margin of land on the river affect the great extent of flat land behind the embankment?—It certainly would.

2521. In what way?—Because the upland water would have no means of getting away.

2522. I am speaking of the flood-water which is in the channel of the river?—The flood-water comes down from the upland, and it would entail embanking the tributaries to something above flood level. Then the flat area would remain to be dealt with. Then, secondly, as to the effect on the Lower Barrow river of the proposed drainage works above Athy. The channel of the Upper Barrow, about three miles above Athy, is now capable of discharging about 120,000 cubic feet per minute without overflowing its banks; when flood has risen to a further height of three feet at the river's edge, the volume of water passing down is about 200,000 cubic feet, and heavy winter flood at Athy amounts to about 250,000 cubic feet per minute. The enlarged and improved outlet channel I propose would prevent water accumulating on the now flooded lands, and be capable of discharging at Athy 320,000 cubic feet of water per minute; this being in my judgment ample—the increased capacity of discharge would therefore be about 23 per cent. In other words, the same quantity of water now sent down past Athy in a little more than six days, would in the future be sent down in about five days, and the volume of heavy winter floods be proportionately and temperately increased during their shorter continuance, but maximum flood at Athy would not be augmented—this is admitted by Mr. Price, C.E., representing the interests on Lower Barrow river. I do not see how the Barrow Navigation Company can be seriously prejudiced by the execution of the proposed works—it is the velocity of the current, and not the depth of water, affects their carrying trade, and in heavy floods the navigation is now from that cause practically stopped, so barges cannot, except at prohibitive cost for horses, be holed against the stream, and going down with the current, they become unmanageable. The mill-owners (whose mills are still working) on the Lower Barrow opposed to me more apprehensive of injury from loss of water in summer than from any temporary increase of water during flood in winter, some of the mills being provided with means of raising and altering the position of their wheels, to meet changes of level of the water in the river. The mill-owners said the water was much more valuable to them in summer than winter, although but little trouble seems to be then taken to prevent its waste. For instance, at the end of August 1886, towards the termination of a long period of dry weather, when the periodically inundated lands were absolutely dry, and the river at its lowest, the quantity of water passing down at Baginbala was about 15,000 cubic feet per minute—of this, 10,500 cubic feet was passing through the wheel of Mr. Crosthwaite's mill, and 2500 cubic

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Mr. James  
Price.

Mr. Richard  
Hassard.

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 Mr. Richard  
 Hannell.

feet going to waste, sweeping through the Navigation Company's weir, works, and sluices, at a short distance above the lock and mill. At the same time at Athy, the total quantity of water passing down the river was about 7500 cubic feet per minute, the available fall for the wheel of Mr. Hannell's mill there being 3 feet, but of this quantity 1500 cubic feet was going to waste, sweeping through the loose stone causeway between the weir and the mill, and conducting water to it; at this time the mill being in want of water, and able to work short time only. Thirdly, as to the effect of further flooding of the low lands adjacent to the river, between Athy and Bagenalstown. The flooded lands on this portion of the river are very limited in extent, owing to the quick rise of the sides of the valley in which the river flows; and much of the flooding is due to the insufficiency of the back drains where the river has been artificially raised for the purposes of the navigation; if these were enlarged and extended to, it would, I believe, prevent any increase of flooding, beyond that which now occurs. No doubt some lengthening of weirs, providing them with sluices, and enlargement of, or rebuilding road bridges, would be desirable on the Lower Barrow between Athy and Bagenalstown; below the Royal Oak Bridge there I think sluices may be left as they are; and as to enlargement of, or rebuilding bridges, originally constructed of insufficient capacity, I think the counties should respectively contribute to the general improvement by providing a large part of the cost. In conclusion, I would remark, that I consider this work should be undertaken as a whole, and in a comprehensive manner taking in all the tributaries provided for in Mr. Manning's Report.

2523. I think the floods rise about three feet above the usual level—above the present bank?—When the flood has risen to 5 feet above the bank, the river is then discharging about 200,000 cubic feet, but the floods rise higher than that.

2524. That is, the extreme floods?—Yes.

2525. What would be the extreme flood above that?—The flood mark is on the cottages, I should think; probably in places 5 feet at the river's edge, where the flooded land extends a long way back.

2526. And then the current is so great that the navigation is very difficult?—It is practically stopped. There was a return sent in to the other Commission, of the number of days in each year between 1871 and 1882, in which they were stopped by flood. That is in the report of that Commission.

2527. Supposing it rise three feet,—that is, the ordinary flood, above the bank,—and supposing an embankment 5 feet high were constructed a certain distance from the margin of the river—would there be any difficulty in preventing that flood-water from going over the land behind the embankment and the adjoining country?—No. In places that might be tried in some of the upper reaches, possibly it might do, but the extent to which that could be carried without artificially raising the channel of the river, is, in my opinion, very limited.

2528. Mr. Barry.—Have you sufficiently studied the possibility of getting offices for the back drains for an embanked system?—That is to my mind, the great difficulty.

2529. Have you sufficiently studied it to say it cannot be done, or is that your impression?—Without artificially raising the channel of the main river, it could not be done. There may be a few cases where it might be done, but, as a general rule, it would not be applicable.

2530. Mr. Abernethy.—In the case of the rivers in England and Holland, and in many parts of France,—for example, you have mentioned the Witham in Lincolnshire,—is there any difficulty found in getting rid of the water from the land behind the embankments?—The lowland water is either taken by sluices or pumped, or by a combination of both.

2531. In many cases are not the embankments continuous for a great length of river, along the margin of

the river, or a short distance from the margin of the river, and the flood stands, from 2 to 3 feet high from the margin on the edge of the river and the embankments, probably for a week?—On the with, as it is called.

2532. On the wash land. Is that found to affect the adjoining country?—The adjoining low country that is behind it, for the most part, pumped. Take the river Nene from Peterborough.

2533. That is an exceptional case?—That is embanked for a great distance, but the low lands do not drain into it, except by pumping.

2534. I beg your pardon.—Or sluice-drained into the sea.

2535. There are sluices into the sea at certain parts of that river?—It is not drained into the elevated watercourse. But in this case, owing to the absence of fall, the river Barrow could not be drained in the way that the Lincolnshire rivers are drained.

2536. Where the river Barrow has very little fall, what difference is there between that river practically, and the river Nene?—If you embanked the river Barrow, we will say from Monasterenra down to the head navigation weir at Athy, and made back drains for the whole length of river between Monasterenra and Athy on each side of the river, it is possible that might be done.

2537. What is the fall of the river between those two points?—It would be making three watercourses instead of one. There is 20 feet fall in 17 miles. That fall in a main river would do very well.

2538. That is considerably more than the fall of the rivers in Lincolnshire?—Yes; but although that fall would do very well for a main river, it would be a very small fall for a back drain, in a main river a fall of 1 foot in a mile would do.

2539. Of course there are hundreds of miles of embanked rivers in England and in Holland and France in the way I have suggested. Are the back drains necessary in these cases to the extent that you speak of?—Yes, unless you pump into the river.

2540. Can you point out to me where pumping takes place, say, for instance, in the course of the Nene?—I do not recollect at this moment, but the whole country there is covered with pumping engines.

2541. Are you not aware that the pumping engines are for the purpose of emptying the cross drains for the ordinary rainfall?—Certainly. The river Nene is embanked, and other rivers are embanked, to carry off the water from the uplands, so as not to let it spread over the lowlands.

2542. The country being flat, and the mindell heavy, and there being no fall in the cross drains across the country, are you not aware that pumping is absolutely necessary in that case?—Pumping is absolutely necessary of course to create a fall.

2543. But as regards the main channel of the river, the embankments formed a short distance from the margin are capable of discharging the floods?—Yes—the floods from the uplands.

2544. The floods altogether?—But then the adjoining flat land—the marsh land—is drained differently, the water is either pumped into the elevated watercourse, or discharged directly through sluices into the sea.

2545. That is the ordinary rainfall of the country; it being a continuously level country, pumping is necessary as a matter of course?—Yes, to get the flooded land dry.

2546. Mr. Barry.—Do you know the Middle Level at all in Lincolnshire?—No, I do not. Cowbit Wash is one of the instances you speak of.

2547. Mr. Abernethy.—In the Middle Level a large portion of the land is considerably below the level of the river embankment?—The river is raised considerably above the surface of the country.

2548. And in many cases the pumping is necessary in consequence?—Yes, almost all the lowlands there are drained either by pumping or sluices direct into the sea.

2549. The rivers do not drain the adjoining country in such cases. They run between banks.—They take off the water from the uplands, and prevent it spreading over the Fen country.

2550. Mr. Price.—(to Mr. Harnard).—Is not the fall shown on the plans above Monasteran, where there are some very heavy cuttings indeed, a fall of 2·10 in the mile. Do not you consider that quite an unnecessary fall, and one that is liable to carry down silt? I have only a fall of 1 foot per mile in my own channel at Lough Erne.—That is for 600,000 cubic feet per minute, and the case is quite different.

2551. I have calculated what a fall of 1 foot per mile would give for that, and I consider it gives sufficient to carry off the water; and there is a fall of 2·7 per mile higher up. Higher up there is a fall of 4 feet per mile, which I consider is certain to cut

away the banks. Then there is 2·40, and 3 feet, and 4 feet per mile.—The quantity of water is very much less.

2552. Then on the other channel of the river, which is a very important one, there is considerable fall. There is a fall of 2·13 per mile, which I consider too much, and 3 feet per mile, which I consider too much; and then there is a fall of 1·30 per mile.—That particular section you are looking at is all through hard, stony clay, and will stand a much greater fall.

2553. Mr. Price.—It is on that account that I should like to reduce the cutting, and give a low fall. I propose, in addition to the embankments, to clean the river all through, and cut it and make it better than it is at present.

Jan. 8, 1867.  
Mr. Richard  
Stewart.

Mr. William Lewis further examined.

2554. The Chairman.—Do you wish to add anything to your evidence?—In accordance with Mr. Abernethy's request at the last meeting, I have furnished a list of the different discharges to the marshes.

2555. You desire that to be put on the Minutes as your evidence to-day?—Yes.

The following document was handed in:

#### RIVER BARROW.

45 DAME STREET, DUBLIN,  
24th December 1866.

S. E. STURGEON, Esq.,  
Secretary, Royal Commission  
Irish Public Works, Dublin.

Sir,—In accordance with the wish of Mr. Abernethy, we beg herewith to forward to you a statement of the sectional areas of the proposed improvement of the different reaches, and calculations of the discharge of flood-waters computed for the new cuts we propose, which we consider would provide, along with the present capacity of the existing river, sufficient facilities for storage and discharge in maximum floods. We consider that the removal of the shoals and obstructions that exist in the river would of themselves, independent of the new works, prove of vast benefit to the district; our scheme proposes considerably more than this, and, we believe, removes for a comparatively small outlay the expense complained of. As shown by the estimate handed in on last Saturday, we propose sinking and securing the leading tributaries towards their junction with the main river in the manner explained, and as shown upon the large diagram, which, in connection with the lowering of the level of the waters in the main

river, will relieve the flooded lands along their banks.

It may be of interest to the Commissioners, if we mention that in the course of the lengthened local investigations we made, and at the numerous representative public meetings at which we submitted our plans, we found an expressed willingness to bear a moderate tax for the work, and that the principle of an area for taxation, extended beyond that immediately flooded, was accepted by Poor Law Guardians representing outlying localities. We would refer the Commissioners to the resolutions that were passed in support of our scheme, as bearing out this opinion, and to the numerous signed memorials containing signatures from all classes and interests, fully expressing the belief of those locally interested, that a modified scheme is upon the whole the most desirable to have carried out at present.—We remain, sir, your obedient servants,

Mr. William  
Lewis.

(Signed) WILLIAM LEWIS, } Civil Engineer.  
W. J. STURGEON, }

#### RIVER BARROW.

Calculations of Discharge per Cubic Foot per Minute.

Proposed new cuts from Mountmellick:—		
Upper section to Garryhinch, . . .	8000	} Collected.
Garryhinch to Pictarlington, . . .	13,000	
Pictarlington to Monasteran, . . .	21,000	
Monasteran to Dunsilly, . . .	53,000	
Dunsilly to Athy, . . .	103,000	

Note.—Quantity by facility of discharge afforded to large storage capacity of part of present river by proposed excavations, to be added to above computation.

Mr. Robert Manning, further examined.

2556. The Chairman.—We shall be glad to hear any addition you have to make to your evidence.—I have carefully read over the evidence of Messrs. Harnard, Styrge, Lewis, and Price, and I will apply myself now to giving my opinion, for what it is worth, upon several questions that arise out of that evidence. The first is the quantity of water to be discharged. Mr. Harnard estimates the quantity to be discharged, exclusive of extraordinary floods, to be 350,000 cubic feet per minute. Now, at page 2 of my report in reference to Lord Castledown's Commission, I say:—"On full consideration of all the facts stated, I am of opinion that the greatest flood which may be expected to pass Athy Bridge will never exceed 400,000 cubic feet per minute; and, indeed, if extraordinary floods, which take place rarely and at long intervals, be excluded, a great winter flood will not exceed 350,000 cubic feet per minute." But again, at page 20 of the evidence before that Commission, on being cross-examined as to the quantity, at Question 347, I say:—"It is very likely that the discharge will not be more

than 350,000 cubic feet per minute. If it was a matter of money, not to stop the drainage from going on, I would not object to take the discharge of the Barrow district at Athy at 300,000 cubic feet per minute, that is, if it was a question of whether the works would go on or not. I would say, take it at 300,000 cubic feet per minute, but remember what I have told you of these extraordinary floods." Therefore Mr. Harnard and I quite agree—in fact, I am under him: instead of 350,000, it is 300,000. At any rate, we materially agree, and it is now a matter of mere preference as to what you will have. Will you be certain not to be flooded, or will you consent to be flooded when the discharge is over 350,000 cubic feet in a minute. Now I find that that 320,000 cubic feet in a minute is 80 cubic feet per acre per minute. It is to be observed that on September 29th at Athy the flood amounted to 1·11 cubic feet per minute, and that the highest flood was in January or February 1833. Therefore, taking the facts that are stated at page 20, and subsequently by me, wherever states what water is

Mr. Robert  
Manning.

Jan. 8, 1867.  
 Mr. Robert  
 Manning

to be discharged, must do so with those facts before them.

Mr. Haasard.—The flood of September 1879 was the highest flood.

2557. Mr. Abernethy.—[to Mr. Haasard].—What was the discharge per minute during that flood?—From the levels that were pointed out to me at Athy to which the flood rose, and the measurements I took there myself, there must have been nearly 385,000 cubic feet per minute passing down that day, but that was due to a rainfall of 2.95 inches a day or two previously—an extraordinary rainfall. It was 2.92 at Portlannington; that was in the centre of the drainage area, and the quantity of water exactly that was passing down was 385,000 cubic feet per minute, which I called in round numbers 400,000 cubic feet.

2558. Mr. Manning.—I may say that I have had a good deal of experience, having been for nearly forty years altogether employed in the drainage of Ireland, and having been in the service of the Government for more than half that time. There are many complaints made against us for want of knowledge, but of all the complaints there was never one complaint of our ever having made a channel too large. That was a thing that was never complained of at all. It was never complained that the works executed by the Commissioners of Public Works were larger than were necessary, and I can only say that I have not changed my manner of designing river channels during that time. I may mention again, as a further caution, that probably the flattest district in Ireland is the Slack at Ballinacree, which I think the Commissioners have seen. The area of it is about 325,000 acres, I think. The level of the watershed line is about an average of 400, and the outlet is 120 above Ordnance datum. Now that is a very flat district in the middle of the central limestone plain of Ireland. I have here with me an observation of floods made last October by Mr. Coddington, and his observation then was 309,600 cubic feet per minute or 85 per acre about upon the catchment. That was not a maximum flood, but a flood which occurred on the 19th October. Now the next thing to be considered is the size of channel. In my report I entered shortly into the theory of calculating discharge, and I now tell the Commission that, although the manner in which the discharge is calculated is practically true, still there are facts connected with hydraulics that would make the poorest engineer very cautious. For example, about twenty years ago, or a little more, it was considered that whether the surface of the bed of a river was smooth or whether it was wrinkled, as they called it, it made no difference; whether the channel was of glass or tin, or earth or stone, it made no difference. That was disproved about twenty years ago, and not to weary you with the different particulars, I will give you two or three. One was a channel in earth, with muddy bottom and sides, and the discharge of that was 174; and one of the same size in every respect, but with a stony bottom, was only 100.

2559. Mr. Barry.—Do you know what the size of the channel was?—I do. I did not like to bring the large book down, but it was one of the channels from the Canal of Burgundy. To pass over other examples, I may go to a very exact experiment made by Monsieur Belin. He got one channel which was coated with pure cement, another channel which was coated with cement mixed with one-third of the finest sifted sand, and they found that that little difference in construction made a difference of 10 per cent. in the discharge.

2560. The Chairman.—In favour of which?—In favour of the smooth channel. I mention that as a circumstance not for the purpose of passing my rating at all, but to show you how an engineer who makes himself responsible for the correctness of his calculations should be very careful not to wire-draw his theory, but he must give some margin. It is the fashion with engineers in other branches of the profession, except hydraulics. An engineer will not be content to take less than four to six times the strength of his iron; and so cautious are they that they will

take a piece of the bar that they are going to use, cut it off and test it, so that there shall not be any difference between one bar and another. In the same way, if we use wood, we are not content with less than ten times the breaking weight; but here it is expected that a water engineer must be exact. Now, that being the case, I think that I did wisely, although I thought that 350,000 would make me pretty secure, to make a channel capable of discharging 400,000. Now the next question is with regard to the increase of floods in the lower district. Mr. Haasard is, as I have shown you, agreed with me pretty nearly as to the maximum quantity, and that the same maximum will occur before as well as after the works if they are executed. That being the case, we will see what the effect will be when the channel arrives at the maximum. If the channel was at the maximum now, the quantity of water to be discharged, or the work to be done by the unimproved river below Athy, would be the natural discharge of the river and its tributaries plus the water upon the flooded lands. If we take a similar maximum after the improvement of the river, the work to be done after the maximum will be the natural flow of the river and the tributaries alone without the water on the flooded lands, and therefore in the new state of things there will be a less quantity of water during the fall of a flood in the Lower Barrow. But then it is only right that we should take the rise of the flood as well when the stream is rising from its ordinary state to its maximum. There is no question at all that the quantity of water that remains on the land, and is not discharged, will lessen the discharge up to the maximum; and we now have it that on the fall of a flood we should be sending less water down the Lower Barrow; and on a rise of the flood we should be sending more by the works. As to the quantity, I cannot say one word about that. I should require a great deal of calculation and experiment to say what that difference would be, but it would be very small. Now the next thing I wish to refer to before I get rid of the discharge is to a not unusual opinion which has been entertained by many people, engineers amongst the rest, and it is this, that it stands as a matter of reason that if you flood lands you do not send down the water, and that therefore there will be a great practical difference in the discharge sent down. With regard to that, I beg to refer you to a book published by the American Government, with reference to the survey of the Mississippi. The reporters were engineers who were employed, Messrs. Humphreys and Abbott, and the book was published in Philadelphia in the year 1861. At page 88 they say, "The floods of the Mississippi are produced by water which does not go into the swamps at all"—there are very large swamps on the Mississippi, and they have their what call levees or embankments,—"but which descends through the main channel of the river, aided by the discharge received by the tributaries on the way. The height of the flood at any point depends on the volume by the river and its tributaries, and not by the discharge from the swamps; but after the river has attained its height the supply is kept up, and the duration of the flood prolonged by the subsequent discharge from the swamps. Formerly, even as recently as 1830, the Mississippi began to pour into the swamps when fully 10 feet below high water. This water filled up the bottom lands, and passed through the innumerable drains to Yazoo river, causing it to discharge uniformly a great volume of water back into the Mississippi, even at the top of highest floods." Then at page 354, after discussing experiments, the statement is made: "These swamps exercise no influence on maximum discharge." I may state, while we are on the Mississippi, that the discharge of the Mississippi may be taken at about 80 to 90 million cubic feet per minute—about 60 times greater than the Shannon and 220 times greater than the Barrow.

2561. I suppose you are aware it only occurs at one season of the year, when the water comes down the Missouri and the Mississippi together from the Rocky

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Mountains?—Yes. It is characteristic of all large rivers that sudden floods altogether cease. In the Ganges and the Mississippi, and other large rivers, there is a gradual swell from one time of the year to the other.

2562. Are you aware of what they call the June freshets in the Mississippi?—Yes, the rises are very great there, and, in fact, the hydrologues of the Mississippi have been a source of discussion for more than thirty or forty years amongst a number of people. Mr. Badin is the gentleman who is acting there now.

2563. I am not wrong, I think, in saying it occasionally rises 60 feet?—I think that is so. I forgot that.

2564. I speak from personal experience. I have seen it rise 60 feet. Can you give any history of what effect what are called the levees in America, or, in other words, the embankments on the Mississippi have had on the adjoining land extending over millions of acres, and the length of those embankments?—I could not do so now; but my principal object in investigating the matter was to see what effect the flooding of lands along a river would have upon the maximum discharge. They say here it has no practical effect. In one case, where a levee had been broken and the lands flooded, they were enabled to make a comparison, and I think in that case it was some 8 or 10 per cent. difference in favour of the embanked lands.

2565. Mr. Abernethy.—What was the general level of the swamp lands below the ordinary surface of the Mississippi?—I am afraid to tell you. I am afraid I should say too much; but here it is actually stated. In what I have quoted, they say that the Mississippi begins to pour into the swamps when fully 10 feet below high water. The depth in the swamps would be 10 feet in that particular place I speak of.

2566. By no possibility could the water from the swamps enter the floods in that case?—No. We now come to the material part of the case—the estimate. Mr. Hazard has been good enough to agree with me in all my calculations of quantities. He also agrees with me as to the quantity of water that must be discharged; but he disagrees with me—and for he it from me to say anything in that respect—as to the price. His estimate is \$300,000, or say 15 per cent. over my estimate, which is \$475,000. That difference is principally caused by the increase in price. My prices were founded upon the actual cost of a number of drainages in Ireland recently made, but there has been a great variation and fluctuation of prices of late years. Now they are beginning to go down again in Ireland—the price of labour is, according to my experience. I have included, which probably Mr. Hazard did not notice in my prices, of which I sent in a schedule, no less a sum than £23,384 for masonry.

Mr. Hazard.—Masonry was included in the prices I sent in.

Mr. Manning.—Exactly, and therefore I wish to explain that the prices Mr. Hazard sent in and the prices that I sent in, if taken and compared with each other, would appear to have a greater difference than does actually exist. I had put the masonry as a separate item.

Mr. Hazard.—The prices that I adopted were the prices for which I had contracted works myself in the same locality, Rathangan.

Mr. Manning.—Was it the fact that the work you contracted was the finishing up of the bottom, for which a large price was paid?

Mr. Hazard.—A portion.

Mr. Manning.—Most of it.

Mr. Hazard.—No, a portion of it only.

Mr. Manning.—But it was an enhanced value?

Mr. Hazard.—No, I think a fair value.

Mr. Manning.—Now, as Mr. Hazard proposes only to discharge 25 per cent. less than I stated that I provided for, it would be natural that his estimate should be rather decreased, as he has to do 25 per cent. less work, and as he has taken my quantities to be

exact, which are 25 per cent. too much, it would seem to be natural that he should make some deduction, as he is only to discharge 330,000 cubic feet in a minute. It would not be entirely to the amount of 25 per cent., because there would be general charges of different kinds that would have to be provided for, whether or no, but if you take half of that, say 12½ per cent., Mr. Hazard's estimate should amount to £481,000, mine amounting to £475,000. I do not think I have any more to say on that subject.

2567. Mr. Barry.—I gather this, that Mr. Hazard's estimate, you think, would be the same as yours if the dimensions were reduced?—Yes, very nearly.

2568. Mr. Abernethy.—You assumed a maximum discharge?—I assumed a maximum discharge. I assumed 400,000, and I say it would be safe to do that, although 350,000 might be sufficient.

2569. Have you any record of how many floods attained the discharge of 400,000?—There is no record of any flood in the Barrow except the flood assumed by Mr. Hazard, which amounted to 400,000.

2570. [To Mr. Hazard].—How often did that occur?—There is something in this report of mine which may throw some light upon it. The Broom district has been drained about thirty years.

2571. We are speaking of the Barrow?—The Broom adjoins it, and it is similar in all conditions of the drainage area as regards elevation, and as regards general formation, and for thirty years the maximum discharge from the Broom district was 267,477 cubic feet per minute, or 932 cubic feet per acre per minute. That occurred on the 7th January 1851, there having been a rainfall of 48 of an inch on the previous day. Then the next greatest flood discharges have been as follows:—In the year 1852 there was 338,000 cubic feet per minute, equal to 884 cubic feet per acre per minute; in 1876 there was a discharge of 701 cubic feet per acre per minute; in 1877 there was a discharge of 80, and in a second flood of that year 73. So that in thirty years after the completion of these drainage works a discharge of 60 cubic feet per acre per minute occurred three times only; that on two out of the three occasions the excess was very slight, and in twenty-five consecutive years, that is, from 1853 to 1877, 60 was not exceeded. That district adjoins that of the Barrow, and is similar in all conditions as regards geological formation and elevation and rainfall, but the drainage area is only 285,000 acres, as against 400,000 in the Barrow.

Mr. Manning.—I think that leaves little doubt that the amount of Mr. Hazard's estimate should be lowered. I think that is a proof, if you are convinced of all these things. Then, with regard to Mr. Price's reservoirs, I think I have read sufficient about the Mississippi swamps to show you what little effect reservoirs have.

2572. Mr. Abernethy.—The case of a river rising 8 to 4 feet, and the case of a river rising 60 feet, are not parallel cases. You cannot compare one with the other. Mr. Price proposes to convert 3000 acres of flooded lands into a reservoir, so, as to reduce the maximum floods by 80,000 cubic feet per minute, for the benefit of the Lower Barrow. He states that £200,000 could be spent on the Lower Barrow, and I understood that he says that would be spent exclusive of any works he proposes for the Upper Barrow.

Mr. Price.—Allow me to correct that. It is only to be spent in case the plan I advocate is not carried out. It is not to be spent in case the plan I advocate is carried out.

Mr. Manning.—There is nothing to be spent?

Mr. Price.—Nothing, in case what I advocate is carried out. Perhaps I may ask a question on this point, because, with regard to the floods in the Lower Barrow not being increased, I think I understood Mr. Manning to say that Mr. Hazard agreed with him. In Mr. Hazard's report on the last Commission, he says this:—"As regards an anticipated increase of flood-water, it will be obvious, if water were prevented

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from spreading over the flooded lands and sent down the river in addition to the maximum quantity its channel is now capable of discharging, that floods at Athy would to that extent be increased, and the duration of the flood would be proportionately lessened; and I am of opinion that very heavy floods, lasting in the upper district after the completion of the drainage works four or five days, would no doubt be increased in volume at Athy by from 80,000 to 100,000 cubic feet of water per minute, which would then be sent into the Lower Barrow as part of a flood, instead of as now being passed down in smaller volume, and for a longer period of time in the latter part of a flood, or during its subsidence." That exactly agrees with what I have stated.

Mr. Howard.—That is, as Mr. Manning said, that the only part of the flood would be increased.

Mr. Price.—It says that there would be more than the maximum flood in the Lower Barrow, and it would be increased by these works because it could not spread over this land.

Mr. Howard.—Not maximum flood. Ordinary heavy flood.

Mr. Price.—That is quite sufficient for me—the very heavy floods.—"I am of opinion that very heavy floods, lasting in the upper district after the completion of the drainage works four or five days, would no doubt be increased in volume at Athy by from 80,000 to 100,000 cubic feet of water per minute." Now, Mr. Howard exactly agrees with me, and I claim him on my side on the question that it would increase the maximum flood.

Mr. Manning.—I merely mention, with regard to Mr. Price's evidence, that, while I say at the most there would be 400,000 cubic feet in a minute, and Mr. Howard says 320,000, Mr. Price puts it down at 240,000. I merely mention the facts, and do not make any argument whatsoever upon it.

Mr. Price.—I merely take 80,000 off. I agree with Mr. Howard as to the flood of 320,000, but I pond 80,000.

Mr. Abernethy.—Your reservoir accounts for the difference.

Mr. Price.—Exactly.

Mr. Manning.—I go then to Messrs. Styrpe and Lewis. I do not think it will be necessary for me to do more than describe what they propose. The estimated maximum flood is at the rate of 616,000 cubic feet per minute, which they propose to discharge in five days at the rate of 103,000 cubic feet per minute, at a cost of £152,000. Mr. Howard states that the river is capable, in its present state, of discharging 120,000 cubic feet per minute without flooding the lands, and that does not seem to agree with Messrs. Lewis and Styrpe. But I must beg to state that floods in large districts do not depend on a single day's rain—by no means. I beg to refer you to my report upon the drainage and navigation of the Lough Neagh district, at page 3.—"In all districts, great or small, there are two principal causes of flooding—one a large rainfall, and the other the insufficiency of the river channels to discharge it at a low level. In small districts the maximum discharge will depend on the rainfall of a single day, or indeed of an hour. In large districts it will depend upon that of a month, or, in some cases, several months. So far as I have been able to investigate the laws of the discharge of the Lough Neagh district, the maximum will usually take place in the month of February, and will depend upon the rainfall of the two previous months. In the present state of the district, seven inches of rain falling in two winter months (when there is little or no evaporation) will produce a discharge which will partially flood the lands! I merely mention that to show that I do not agree with Messrs. Styrpe and Lewis in the method of calculating their maximum. I may say that they do not propose to drain the tributaries except to a certain extent, but to make them pay a sort of an outfall tax. The only other observation I will make is with regard to the mills. In their report,

which has been handed in, they deprecate the destruction of mill power, and in the fourth paragraph they say:—"Of the formidable impediments, the removal of the shoals and shallows is not attended with other than engineering difficulties, but, as regards the obstructions by the mill weirs, other important considerations and varied interests are involved, the rough and ready way being to remove those weirs entirely and compensate the mill-owners for the loss of water power. You will excuse me for saying that, if that is intended to represent the reader's opinion of myself or of the Board I serve, that has not been the rough and ready way of proceeding. I beg to refer to a paper which I had the honour of reading before the Institute of Civil Engineers of London twenty years ago upon "The flow of water off the ground." At page 9 of that paper, I say, talking of the supply of water to towns:—"The subject has hitherto been discussed only in relation to the economical supply of towns, but the consideration of the relative interests of the water companies and of the mill-owners must not be lost sight of. At first it may not be easy to perceive how injustice can arise by the purchase of water power, if, as is often the case, both the companies and the owners gain the former by paying, and the latter by receiving double its value. Yet the engineer should never forget that his special province is to improve with as little incidental injury as possible. It is, therefore, clear that he should always economize unless or injurious floods, if by pressing that course he can obtain his object at the same cost as by the destruction of mill power. The question of water power is, however, of too great importance to allow of its being treated in a satisfactory manner in the present paper. It is one which is daily claiming more attention, and it suggests the inquiry whether the principle of economy in expenditure for providing a town supply should so prevail as to induce an injurious interference with the natural regimen of rivers and the destruction by its obstructions of the whole water power of the country. Indications were not wanting, in the last session of Parliament, which would lead to the belief that the Legislature would eventually greatly restrict, if not entirely prevent, such injurious interference with rivers." I merely mention that to show that I do not want to destroy mills, nor is it necessary, nor do the Board which I have the honour to serve.

2573. Mr. Abernethy.—Not necessarily for drains or navigation. That is applied to the supply of water to towns, and the question there is whether the interests of the mill-owners or the supply of water to the population is paramount.—The question here was this, that when you had your choice of purchasing a mill up or of allowing the machinery of that mill water, if you could do it at the same cost the proper thing to do is to keep the mill there.

Mr. Styrpe.—Might I make an observation on the remarks of Mr. Manning on our modified scheme? I am anxious, in the first place, to correct any impression you might have in your minds as regards the use of the words "rough and ready." We applied them to the removal of the weirs. It was no use to compare what we suggested with what Mr. Manning proposed in his report to the Commissioners. In fact, Mr. Manning's report to the Commissioners disposes that, because he proposed himself to employ sluices; but the observation was put in there merely as a general observation as to the general policy to apply to such cases. Rather than adopt the rough and ready way, we could by the expedient of removable sluices accomplish the same ends and still preserve the water power. As regards the other points upon the question of the discharge which our channel will give, and which we estimate at 103,000 cubic feet per minute, we have considered that we have the discharge of the river itself, which Mr. Howard states is now equal to 120,000 cubic feet per minute to our credit in addition to the 103,000 cubic feet per minute, and that our cut with smaller dimensions will enable us to discharge 225,000 cubic feet per minute. Looking at the matter

from a commercial point of view we contend that our scheme, at a cost of £165,000, gives very great value to the upper district and discharges that large quantity. I may mention that the prices we have put down are rather nice liberal to the different items than anything that has been put forward in the other propositions.

Mr. Howard.—Messrs. Lewis and Styrpe's paper states:—"We have calculated upon providing a sufficient area to discharge winter flood-waters at the rate of 105,000 cubic feet per minute, the velocity averaging 168 feet per minute." Then a little higher up they say they propose the new channel to be 40 feet wide at the base. Now such a channel as that certainly would not discharge the 105,000 plus the 120,000.

Mr. Abernethy.—That is a matter of calculation.

2574. Mr. Barry.—Supposing that monetary considerations obliged you to limit your expenditure on the river Barrow to say £250,000 or £300,000, would it be your opinion that such a sum of money could be spent with advantage to the district?—Yes, certainly, but it should be on a clear understanding that I, as an engineer, was not responsible for the drainage of the land at every time during the year.

2575. The Chairman.—Even ordinary floods?—Oh yes; but I cannot tell when there may be an extraordinary flood at any time in the year.

2576. Mr. Barry.—Are you at all able to tell us what quantity of cubic feet could be discharged and provided for by an expenditure of £250,000?—Not at present. I think for £200,000 you might make a design which would discharge ordinary winter floods, but would be liable to be flooded every winter and at every time in the year on occasions.

2577. Do you think you would avoid summer floods by such an expenditure?—Yes, I think it is likely, but the most destructive floods in this country are the summer floods.

2578. In the hay time?—In the hay time; and they are very nearly as large as winter floods, sometimes larger.

2579. Mr. Abernethy.—How often are they larger?—I could not tell that, but I have seen autumn floods which probably, because they are more destructive, were considered greater. But, as a matter of fact, Mr. Bateman, in designing the works for the Shannon, takes his maximum at 1,600,000, which was calculated by our officers, and he takes 1,300,000 cubic feet per minute as the autumn flood. There you have it.

2580. Mr. Barry.—But would you, as an official of the Government, commiserate an expenditure of £250,000 for the partial relief of the Barrow district?—I think if I were directed by my official superiors to make a design for £250,000 I should be able to do that, giving great advantage to the part of the district on the Great Barrow. My estimate of the works is that they would cost £215,000. Now, taking that as a guide, I say that I can make a design for I had better say, £200,000, so as to be a great advantage to the district, and cutting out the more expensive works.

2581. Would that expenditure of money be in improving the main stream completely, or in improving the main stream and the tributaries to a partial extent?—It would be in reducing the design for the main stream and improving the tributaries, and probably leaving some of them out altogether. As an engineer, of course, my desire would be to do the main stream to the full extent; because we all know that, after having gone to the expense of unwatering, as we call it, by dams or otherwise, we do not care then whether we take 100,000 or 300,000 cubic yards out; and therefore it would be a pity not to take the full dimensions out of the main channel when you had it dry.

2582. Mr. Abernethy.—You mean by constructing dams and laying a portion of the river bed dry?—What I mean by that is this: that if I had a certain

portion of the river bed dry, and I had only 100,000 cubic yards to take out of it, the relative cost of doing that would be much greater than if I had 300,000, because I had gone to the expense of making those dams.

2583. That is obvious. Supposing that there are heavy floods take place while your dams are across the bed of the river?—Well, it has often occurred to me; and they have been often carried away.

2584. Mr. Barry.—Then, if you were limited to £300,000, would you advise that the main river should be accommodated for discharging perhaps Mr. Howard's calculation of discharge, or would you reduce that quantity of discharge below Mr. Howard's calculation, and spend the money over the whole district?—No. I would reduce my discharge, as I stated, to about 300,000 cubic feet in a minute. That is what I would attempt to reach with £300,000.

2585. And you would take that as the starting-point?—I would as far as I could, but to enable me to make such a design I should be informed as to whether there was a condition that it should be a paying design; because that would influence me very much in taking in so much land so as to pay.

2586. Mr. Abernethy.—You admit that, if a heavy flood took place during the time you were constructing dams across the river, it probably might carry them away?—Yes.

2587. Such a contingency as that would render the ultimate cost of the work somewhat uncertain?—Yes; almost all drainage estimates have been exceeded.

2588. If it was found practicable, and would effect its purpose, in some sections of the river to construct small earthwork embankments a short distance from the margin of the river, there is no risk attending that work?—No, there would be no risk in constructing embankments, but you commence with the assumption that the system would be successful.

2589. Well, engineers generally arrive at conclusions when a system has been carried out extensively for a long period of years and has been found successful. Now can you tell me when and where such a work has failed?—I had hoped that I should not have any discussion about this, but I suppose you would wish me now to give you any little knowledge I have of it.

2590. Yes, I would.—I have always found that embankments in Ireland were not successful; that they were not such cheap things, and the effect of them was, as we all know, to reduce the surface inclination in floods, and to raise the bed of the stream. That has been found to be so since the time of the improvement of the river Po in Italy.

2591. Yes; which I know something about.—And that river Po in Italy, as you know, is very much higher than the adjoining lands, and very much higher than it was at the time they commenced the improvements.

2592. Yes; in some cases that is so. Now I want to ask you a question upon this point; you speak of embankments having been tried in Ireland?—Yes.

2593. Where?—In the King's County. I forget the name of the district now; but I, as an independent engineer, went over that district for the purpose of advising the proprietors, and I found that the effect of those embankments was not successful. I find also, going back to the district of the Barrow, Mr. Howard has stated to you, I think, in his evidence or reports, that there is a large tract of land there which was embanked, and which has not been successful.

2594. But, in the case of the river that you specially alluded to, was the embankment there constructed on the margin of the river, or was there a wash land between it and the river?—No engineer who knows his business ever constructs a bank within 10 or 15 feet at any rate of the margin of the river, or probably 20.

2595. Of course you know the Blackwater river?—There are several of that name in Ireland.

2596. I mean the one running into the Lough Neagh?—I do.

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2597. Is the bank there on the margin of the river?—I forget that; but, to go again to the system of embankments, I will tell you a place where you could actually follow nothing else, and that is in that northern part of the Fens which I travelled over some seven or eight years ago, with reference to the improvement of the Shannon. The system adopted there is this, as Mr. Hassard has explained; you embank out very low lands against the water coming from landwards.

2598. You mean tributary streams?—All land-water, because invariably the outlet is the sea.

2599. Yes, that is the general rule.—Well, they have what they call owerh banks there; they allow the tide and the floods to run between those banks; but then the difficulty of the outlet, which is talked of by Mr. Hassard, is met in this way, that there is a discharge of low water just the same as in Holland.

2600. Can you point out to me any river with a small fall in Ireland that is embanked, with embankments a distance from the margin of the river, as in the Lincolnshire and Bedfordshire rivers?—I think not; and I believe that would be almost impossible.

2601. Why?—Because you would not have enough fall.

2602. But they have no fall of any consequence in the cases I have mentioned.—Then you must have pumping.

2603. No; that does not follow.—Then how will you get rid of the water?

2604. In the Fen districts, where the level of the land is below the ordinary summer level of the river, the pumping is simply to provide for what is impossible to be discharged from the river otherwise than by pumping. The lands being considerably below the surface level of the river, if a heavy rainfall comes on those lands, pumping must be resorted to as the only way of getting rid of it.—Yes; but, turning back to the question of the Barrow (after the discussion that I have had the pleasure of taking part in with Mr. Abernethy), I can only say this, that there may be places on the river Barrow for short distances where embankments would save a little expense. But to take a system of embankment through the Barrow drainage district from one end to the other and make it a system would be impossible, in my opinion.

2605. No one proposed that.—And further, my friend Mr. Price has given you evidence that, even if you did so, it would cost £418,000, so that there appears to be no use in it.

Mr. Price.—I do not at all agree with Mr. Manning's point. If I gave out my estimate at his price it would come out to about £300,000. But, knowing every yard of stuff and what it would cost, I say it is utterly impossible to carry out that work at those prices, and I say that deliberately.

2606. Mr. Barry (to Mr. Manning).—I am sure the Commission are very anxious to have your opinion on this question of embankments, and whether there are any general considerations which occur to you affecting the desirability or otherwise of embanking rivers in Ireland?—I believe that the maintenance of them would be very costly, and probably would not be attended to. I think also that the formation of those embankments would have the effect of reducing the surface inclination, and so making the maintenance of the river itself expensive.

2607. Assuming that all the embankments of a river system were put under the control of a Drainage Board, do you think there would be any difficulty, as far as the Drainage Board is concerned, in carrying out the maintenance satisfactorily?—It would be more difficult for a Drainage Board to carry out the maintenance of those embankments than an ordinary drainage district, and we have numerous instances of where a Drainage Board has not done that.

2608. Have you formed any estimate as to what the maintenance rate would be on the Barrow, supposing your proposal were carried out.—Oh, not at all.

2609. You cannot give the Commission any idea on that point?—No, I cannot. I would be able within two or three days to give you what was the average cost of maintenance of work.

2610. Of such a work?—Of such a work.

2611. I think if you could we should be glad to have that. Assuming merely for the sake of argument that a complete draining of the land could be obtained by embankments within a fixed sum, say £300,000, and that within that fixed sum of £300,000 you could only partially relieve the floods by a system of sinking the river, may I ask you which you, as Engineer of the Board of Works, would prefer?—That is assuming a perfect success with embankments.

2612. Yes.—And not a perfect success with sinking?

2613. Yes.—I think it is obvious; I would prefer the embankments if you assume the efficiency of them, and the contrary in the case of the sinking.

2614. If you assume the efficiency in spite of the difficulties of maintenance, you would prefer the perfect system?—I certainly would go quite as far as you wish there, and say that if you can make a perfect drainage by embankment, except I had some good reason for stating that the maintenance of them was intolerable—that the difficulty was so great it would not be worth while having the embankment—but if you could maintain the embankments at any reasonable cost I would certainly have the embankments, assuming that they are successful.

2615. I mean assuming that. You do not consider that the difficulties of maintaining them would overbalance the advantage of a more complete system?—I do not; but what I think about it is this, that if you go in to make a design for the embankment of the Barrow this moment you will find that your system will be of great length; and that in long systems any failure, in any part of that embankment or outlet, will make a failure of the whole system so far as drainage is concerned.

2616. I do not admit that (but I do not want to pursue the subject), because it is possible to localise the effect of the breaking of banks.—I think if you go to make a design of embankments, you will find great difficulties, you will have to embank all rivers above the flood-level of every tributary in the country, and sometimes to get syphons under those tributaries.

2617. Have you sufficient data in the archives of the Board of Works to make an estimate of an embanked system?—I do not think I have. I would not rely on such an estimate. Any one of us going to do it would say, I must go and look at the whole of the place myself, and see every part of it. I would not think of making an estimate from theoretical information.

2618. I do not mean that; I mean sufficient cross sections and data, as to the levels of the ground, to be able to lay down a system for the Barrow?—Well, I think you might make a preliminary report upon it; but I do not think you could make, for example, plans which would be, in the nature of contract plans, or give you any reliable estimate for the cost of it.

2619. Have you sufficient data to define the level of the ground adjoining the banks of the river, for say 100 yards on each side?—Oh yes, approximately. I have merely the Ordnance levels and such sections as I have given to this Commission. But if, for example, this Commission were enabled to say there is £300,000 for this matter, and if they express their opinion that a system of embankment, so far as they see, was the best, it would be my duty at once, as Engineer to the Board of Works, to commence at that system before anything else, and find that it was wrong before I went to try any other system.

2620. You think that the Board of Works would be able to investigate the advantages and disadvantages of that system in a way sufficiently precise to arrive at a conclusion?—I think so.

2621. And without any very large expenditure?—



Yes. Do you mean that they should now endeavour to arrive at that conclusion on the chance of £300,000 being given?

2622. No, I did not mean that. I did not mean to fix any sum for one moment. I merely mentioned the sum of £300,000 just now by way of fixing a sum that was less than your estimate. What I wanted to know was whether, in the archives of the Board of Works, there are sufficient data to enable the Board of Works to see what an embankment system would cost, and how far it could be made perfect.—I do not think we have such data at the Board of Works as would enable us to give any reliable estimate.

2623. I was only asking for information as to this point. You gave an answer that Messrs. Lewis and Styrpe's plan only provided for 100,000 cubic feet per minute?—Yes.

2624. And I dare say you heard Mr. Styrpe explain that he meant that to be additional to the present discharging power of the river?—Yes.

2625. I was going to ask you whether you could give us any information upon that point?—I would not like to say much at all about the calculation of the quantity of water given by Messrs. Styrpe and Lewis, except that I do not agree with it. Mr. Hazard has given you the facts.

2626. It seems rather obvious that if Messrs. Lewis and Styrpe are to make the channel larger, they will discharge more water than at present?—That is the perplexing thing, no doubt—that, in fact, by spending £150,000, they will make, by some means that I do not know of, the channel discharge less water than it does without that thing being done to it.

2627. That is evidently a fallacy?—Yes.

2628. Messrs. Lewis and Styrpe did not deal with the tributaries?—No, they did not, except to a very small extent.

2629. Tell us what your opinion would be of a proposal which did not deal with the tributaries?—The statements made in Messrs. Lewis and Styrpe's report, I think, are fallacious, because they include the whole area valued by Mr. Fitzgerald as relieved by the works proposed in my design, but they do not propose to go near those works, and therefore the cost per acre of that drainage scheme must be altogether fallacious.

2630. Could you tell us how much would have to be added for the tributaries to Messrs. Lewis and Styrpe's estimate to put those tributaries in the same position as you would put them in?—Yes; I could tell you what the tributaries would cost—£240,000, according to my estimate.

2631. But then, of course, it is fair to add that Messrs. Lewis and Styrpe's deepening of the river would not be to such a great extent as yours, and therefore the effect on the tributaries, to put the tributaries and the main river in the same position, would not be quite so great as your estimate?—No; in fact, the application of £10,000 per annum to the gross improved value, applying it to the scheme of Messrs. Lewis and Styrpe, is not correct.

2632. Mr. Abernethy.—Then according to you the tributaries are the major works as regards expense?—Yes.

Mr. Barry.—Perhaps Mr. Styrpe will explain the matter?

Mr. Styrpe.—On the last day, when evidence was being taken, Mr. Hazard complained that the river at present was capable of discharging 120,000 cubic feet without overflowing the banks. Then I said, Seeing that we deepen the river, and certainly will make the river discharge more than it does at present, we are entitled to add this 120,000 cubic feet that Mr. Hazard objects to that the river will do itself. The way we looked on the matter was this—the 100,000 cubic feet to be discharged by the new cut was to be discharged without raising the level of the water much above the present level. If the river is to be raised to a point where it will just overflow the

banks under the circumstances, of course the discharge would be greater; but our discharge of 100,000 cubic feet per minute was, upon the assumption that it would not rise to a point at which it would overflow the banks.

2633. Mr. Abernethy.—[to Mr. Styrpe].—That you would deepen the channel and enlarge its sectional area, so that it would not overflow the banks?—We should deepen the channel, and enlarge its sectional area, so that it would not overflow the banks.

2634. Mr. Barry.—You gave the dimension of 60 feet as the bottom width of the river?—Quite so.

2635. What is the present average bottom width of the river above Ashy?—It will probably be about 150 feet; it is very wide and very shallow.

2636. I said the present bottom width?—The sections we have taken give the bottom width very wide and very shallow. In some of the sections it shoals up to an island in the centre.

2637. Then your bottom width of 60 feet is a deepening of the present bed of the river?—Quite so.

2638. Do you anticipate from that that the ordinary water-level would be lowered?—We propose at Ashy to keep it at the present summer level, in order to maintain the present water power for the mills. Higher up the country it would be lowered considerably.

2639. At the lowered water-level your discharge would be 100,000 cubic feet per minute?—Quite so.

2640. And if the river runs full from bank to bank, you should have credit for the 120,000 cubic feet to which Mr. Hazard has alluded?—Quite so.

2641. Mr. Peto.—Do you agree with Mr. Hazard's statement, that the present flow of the river is 120,000 cubic feet per minute without flooding the banks?—I am sure he is quite correct in that.

2642. Were you proposing to add 60 feet of width to the existing bed of the river?—No; to make a cut in the existing bed of the river—in addition to the river. Of course, when you go down in a cut, the discharge of a deep channel is proportionately very much greater than a very thin layer of water would be.

2643. [To Mr. Manning].—Suppose you were limited to this expenditure of £300,000 to carry out the best scheme you could for that sum of money, would you be able to calculate with sufficient accuracy on the resulting benefit to the adjoining lands to warrant you in making a specific charge against them for the improved value of the lands?—Most certainly. If you ask me to make a design, the cost of which shall be £300,000, and the return for which, as interest, will amount to so much per cent, I will endeavour to do that, if possible, on the basis of Mr. Fitzgerald's valuation.

2644. But would you anticipate that the return on improved value would be less than this calculation of Mr. Fitzgerald's of about £10,000 a year?—I do not think so. With regard to this valuation of the improved value, Mr. Fitzgerald himself says it is very low; and with regard also to the prudence of undertaking a work which will only give you so much per cent, you must understand that this is merely a very low value of the additional rent which will be placed upon the lands, and that therefore the value of the works themselves must be measured by the actual value to the occupier. For example, suppose I am a farmer, and have 100 acres of land; the land is drained, and my landless charges me £5 a year; the £5 does not represent the value to me,—it may make my farm worth (say) £200 a year under certain circumstances; and therefore I think it is a mistake to measure the value by the lowest possible amount you could add to the tenant's rent.

2645. But do you think that an expenditure of £300,000 would enable you to carry out works that would warrant you in charging against the occupiers or owners of the adjoining lands this £10,000 a year?

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—I think so; but of course not on the present valuation.

2646. As regards the Lower Barrow, I want to ask you one or two questions about the mills. Are the mills on the Lower Barrow frequently flooded out at present?—Frequently.

2647. Do you anticipate that, if your large scheme were carried out, the number of days in the year that the mills in the Lower Barrow would be flooded would be more or less than under present conditions?—It would make no difference; it would rather improve the mills.

2648. Are they frequently stopped for want of water in summer?—It depends upon whether it is a dry summer or not. I know that the mill-power at Carlow, for example, except for some additional boards being put up upon the weir there, would be stopped in summer,—that they have just worked that river to the extent that it is possible for them to work uninterruptedly during the whole year.

2649. Do you think, if those works were carried out which are proposed, the mills of the Lower Barrow would be more frequently stopped for want of water in summer than they are now?—They would not; they would rather be improved. Because, whether I am right or wrong, my opinion as to the effects of

artificial drainage is that it will increase the low summer discharge as a matter of necessity.

2650. Would the putting in of sluices in the weir on the Lower Barrow be of any benefit to those mills that are now flooded out—movable sluices, such as have been put in elsewhere?—In my report I recommend that sluices shall be put at Bagenalstown. The whole matter of the Lower Barrow is treated in my report of the 15th October 1885.

2651. Is it your view that, if those works were carried out on the Upper Barrow, some works ought also to be carried out at the same time on the Lower Barrow?—I believe, whether the works are carried out or not on the Upper Barrow, the Lower Barrow should be improved.

2652. How should those works be paid for?—I cannot tell. I only know that there will not be any necessity for improving the Lower Barrow in consequence of the improvement in the Upper Barrow, in my judgment.

2653. You do not think it will necessitate anything being done?—No.

2654. Mr. Barry.—You mean that whatever necessity exists, exists in the Lower Barrow itself independently of those works on the Upper Barrow?—Decidedly.

[The witnesses withdrew.]

[Adjourned for a short time.]

Mr. Thomas Fitzgerald, called in and examined.

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2655. The Chairman.—I understand that you can give me information about the valuation of certain districts of the Barrow?—Yes.

2656. You have had this paper of questions, I think?—I only got it this morning, and I have not read it.

2657. Then perhaps you will favour us with your views with regard to the valuation of the land you have made in the districts of the Barrow?—My valuation is given in the Blue-book. I cannot add to or subtract from it. I have examined the Barrow twice. I examined it on the passing of the 1863 Act; and then lately, under the Board of Works, I examined it all again. I was not supplied with any sections at all,—either longitudinal or transverse,—and I had to take the levels, as well as I could, with my eye, and from the flood-marks on the lands. My valuation was based on this, that all the flooded and submerged lands would be permanently relieved from floods, and that the injured lands could be capable of being thoroughly drained 4 feet deep. It was on that basis I made a valuation.

2658. Did you confine that valuation to the lands either permanently injured or partially injured?—First the flooded lands, and then the injuriously affected lands. They were the two classes.

2659. You did not include in your valuation the whole catchment area of the Barrow?—No; because some of it is quite dry.

2660. Is it your opinion that the assessment should be confined to the lands that are relieved from flood, and relieved from the injurious effects of floods?—I think so. There should be—but I am not able at present to hit upon it—a small tax put for the benefit of the district within the catchment basin; for certainly the distress will be benefited by the removal of those constant floods.

2661. But, inasmuch as the waters that are flooding the lowlands must necessarily come from the higher, is it not reasonable that those lands should be partially taxed, if not so heavily as the lowlands?—I think there would be justice in that, but it should be but very small, and it should be very closely examined to

define it. It would not do to put a uniform tax on the entire catchment area.

2662. If they have taken advantage of the modern system of drainage, they necessarily bring down the water on the lowlands much quicker than formerly?—Yes.

2663. Therefore they are injuring their neighbours by benefitting themselves, and is it not fair that they should be taxed to a certain extent?—I think so.

2664. In that case you would include the entire watershed of the Barrow district?—Yes; but it should be re-examined for that purpose. I did not go into that part of it. I confined my valuation to the two classes that I have mentioned.

2665. What was the amount of your valuation of the improved lands?—It is in the third page of my report. "The total quantity of flooded and injured land is 45,641a. 6r. 32p., the present annual value of which I consider to be £18,168. 18s. 3d. The probable increase in value I estimate at £10,033. 18s. 6d." Then I gave each county separately.

2666. What did you put the increased value per acre of the 45,600 acres at, separated into the two classes of flooded lands and partially flooded lands?—It varied, I think, from 6d. an acre up to 20s. an acre per annum. The 6d. per acre increased value was on some of the deep bogs, that were used for turfery, and even that was objected to by some of the proprietors, though it enabled them to go down 4 or 5 feet deeper to the best of the turf.

2667. Why did they object to it?—I think that the general feeling throughout the country is to object to any taxation.

2668. Although they are benefited by it?—They would all be very anxious to get works done if they were done for nothing.

2669. Did you form any estimate as to the cost of carrying out the works to effect that improvement?—No.

2670. You are probably aware that it is some £500,000 which is proposed to be spent?—I am aware that there are two different plans, and I have heard there are two more.

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2671. Supposing that a modified scheme were carried out, which would cost a much less sum of money, say £500,000, have you directed your attention to the lesser value that would be necessarily put upon the lands by not carrying out the complete scheme?—No, that was not put before me at all.

2672. Have you any views upon that point?—I have. I think it should be a complete scheme.

2673. You would not recommend the expenditure of a smaller sum?—On piecemeal drainage—certainly not.

2674. As there is very little probability of the £500,000 being found by either the Government or the district, or the two united, is it your opinion that it would be unwise to spend even £500,000?—Well, it is a case like that I should say half a loaf would be better than no bread.

2675. And you would advise the expenditure of the smaller sum, in case the larger sum should not be provided?—Yes, but that would involve a new valuation, because the smaller sum, I presume, would be confined to the main channel.

2676. It would be spread over the whole area, and though the relief would not be complete from all floods, yet it would relieve a considerable portion?—If that was to be distributed over the entire tributaries, I think it would be very desirable.

2677. Mr. Abernethy.—Supposing the lands could be relieved from ordinary floods, would not that be a great advantage?—It would.

2678. Mr. Barry.—Would that seriously modify your estimate of the improvement? Supposing extreme winter floods were still allowed to flow on the land, and the land was relieved from all ordinary floods, would that make any serious difference in the amount of your estimate?—It would lessen the probable improved value certainly.

2679. Could you give us any notion of how much?—No, I could not at all. It is very hard to define how far the injury of the main channel floods goes, when they are met by the floods of the tributaries. I do not know whether I explain myself, but there are two places now on the Barrow, the Rathangan district and the Kildare district, the Kildare district particularly, which have done serious damage to the low-lands.

2680. The Chairman.—As an engineer, have you had much experience of drainage works in Ireland?—More as a valuer than as an engineer.

2681. Have you had your attention turned at all to the system of confining the floods by means of embankments?—Yes. I saw a very remarkable case of that on the Barrow—on Mr. Bowen's property. They embanked all round to keep out the floods, but they could not get out the backwater. It was a decided injury, and they had to cut the bank.

2682. Were those banks carried close to the margin of the river?—A little way in from it.

2683. How far?—I could not tell you. They were not in immediate contact with the river.

2684. Were they 10 feet away?—Yes, and sometimes 30 feet and more.

2685. Do you think the same effect would have been produced supposing the banks had been carried sufficiently far back on each side to take the volume of water, so as to avoid it going over the top of the bank?—It would lessen the height of the water certainly.

2686. The evil you have just described would not then occur, would it?—Not to a great extent.

2687. Would it to any extent?—There would be backwater. There is another case above Monasteran, on the property of the late Mr. Fleming. I think Mr. Kinsaid is the agent. It is banked all round, and I have seen that all flooded inside when the Barrow outside it was 2 feet lower.

2688. That embankment again, I think, is close to the edge of the river?—Yes. The sluices there were not of sufficient capacity to let out the flood-water quick enough when the water went down.

2689. You understand what I mean by keeping the banks away from the river, so as to make one broad stream of sufficient capacity to take the entire volume of the flood-water?—Yes—what the country people call a deep floating outside.

2690. Mr. Abernethy.—How did the floods get into the space behind the embankments—over the top?—A large flood would break down the embankment.

2691. Mr. Pitt.—Then that accident was the result of defective embankment?—Yes.

2692. And then the sluices were only constructed to let off the surface water, and when they had to let off flood-water as well they were incapable of doing it?—Yes.

2693. That is not a necessary consequence of the system of embanking?—No.

2694. It is from a defective embankment?—Yes.

2695. The Chairman.—You would probably say, from your experience as an engineer, and your knowledge of what has been done in England and on the Continent, that the system of banking out rivers is by no means so imperfect as it is generally considered in Ireland?—I believe not. I have no experience.

2696. Has it not been effectual?—I have no experience of that.

2697. Do you know anything of the drainage in Holland, for instance?—Yes; but they must have steam power behind the embankments in Holland to pump out the water.

2698. Have you had experience of the drainage in the Fen districts of England?—I have not. My experience does not extend beyond Ireland.

2699. Then you do not know whether the embanking system has been successful in England or not?—No, I do not.

2700. Mr. Pitt.—Have you been in the neighbourhood of the Blackwater river that runs into Lough Neagh?—I have.

2701. That is embanked. Have you noticed the effect of the embanking there?—Not on the place where I was. I was down at the Benbulbin side.

2702. That is some distance up the river?—I did not see it. I know all the Benbulbin district.

2703. You say that your estimate of the improved value was on the assumption that the system of drainage would permanently relieve the lands from flood?—Yes.

2704. When you say permanently relieved, do you mean in every extreme case of flood that still there would be no lands flooded?—I understand from Mr. Manning's estimate that there would be no flood—that he had made provision for extraordinary floods.

2705. Those extraordinary floods come perhaps once every five years. If those floods were not provided against, but the ordinary floods were provided against, do you think that would make much difference in your estimate of the value of the improvement?—I should like to see the plans. I do not think it would. It would lower it certainly.

2706. Supposing a flood occurred only once in the winter, and lasted three or four days, do you think that that occurrence would seriously diminish your estimate of the improved value?—Well, it would not on lands adjoining the Barrow. The Barrow differs from most of the other rivers in Ireland. It does not bring down nourishing sediment; it brings down raw sand from the mountains, and when that spreads out into the great land it injures the meadows for the next year, and they cannot grow it. One flood will do it. On the Lower Shannon it is not so bad as that. The flood brings down on the meadow-lands below Kildare nourishing material for the grass. But the Barrow floods come with tremendous velocity down from the Slieve Bloom Mountains, and they bring down the red, raw sand.

2707. Mr. Abernethy.—So that, in the case of the Barrow, the winter floods, instead of benefiting the lands, rather injure it. The deposit left injures the land?—Yes, it does. That is the information I got

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from every man along the river. There was one portion of the Lower Barrow where they used to get £4 or £5 an acre for the hay, and it was let this year for 7s. 6d., and some of it not cut.

2703. Is that on account of the deposit left by the river?—Yes.

2704. Mr. Pitt.—The previous winter?—The previous flood. The biggest flood that was there for the last four years was three weeks ago. The Barrow from Monasteroevan up to Mountmellick has been most barbarously neglected since I went on it first; and I do not exaggerate when I say that I think the bed of the river is some 10 feet narrower than when I went over it first, and it is closing every day. The same down the Lower Barrow near Bert. I do not know whether you saw it—a lot of little islands have been thrown up which did not exist when I first examined it, and that is going on all up the river.

2710. The Chairman.—To remedy that state of things, would you suggest a Drainage Board to embrace the whole catchment area of the Barrow?—I think I would, but under strict supervision by the Board of Works.

2711. With a suitable engineer to take charge of it?—Yes.

2712. To see that the works were properly maintained?—Yes; and I would suggest that the collector should collect the cess, and not private parties.

2713. The district should be taxed, and the taxes collected in the same way as the county cess?—Yes.

2714. Mr. Pitt.—Would you spend that charge for maintenance of the bed of the river over the whole area?—No; you must do it ratably.

2715. But mainly over the whole area that the river drains?—Yes.

2716. Mr. Barry.—I think you put in an amended estimate of the value of this improvement?—Yes.

2717. Would you state what that is?—There were several objections by parties that I had brought in more land than they thought was injured. I went over and examined it, and I had to increase some of this property and reduce others. This is the review. The present annual value is £17,612, 3s. 11d., and the probable estimate of increase was £2952, 17s. 6d.

2718. Mr. Pitt.—That was after a rehearing or reconsideration of your first award?—I told the Commissioners that I was not able to attend at the hearings here, but I told their secretary, who took the notes, that I would visit every one of those who objected.

2719. That is, where there was any objection to your first award?—Yes.

2720. Mr. Barry.—It has been stated to us that your estimate is rather a low valuation of the improvement. Do you consider it is too low?—No, I do not.

2721. Do you feel inclined to modify it in any way?—No, I do not think I would.

2722. We have had evidence here on the subject of a scheme which proposed that a more moderate sum of money should be expended on the Barrow, and that floods would not run off in less than five days, but that the greatest flood would run off in five days. Could you give us any opinion as to the value of such a mode of dealing with the problem of the Barrow?—I do not clearly understand that.

2723. The proposal is that, instead of making so large an excavation of the river as Mr. Manning proposes, a more moderate-sized excavation should be made. That is the proposal of Mr. Styrpe and Mr. Lewis, and the result of that is that they consider extreme floods would run off in five days, but that the land would be flooded for five days in times of extreme flood?—That would do incalculable injury to the land.

2724. You think that such an arrangement would very seriously modify your estimate of £10,000 improvement?—I think it would. From my knowledge of that place, the floods come down there so suddenly and so largely that in five days the injury would be done—all that deposit would be there.

2725. Therefore your estimate of £10,000 improve-

ment would not apply to such a plan as that?—No, it would not.

2726. It would be seriously different?—No doubt I should re-examine the land.

2727. Could you say as much as that, that it would be seriously less than the £10,000, if such an improvement as I am talking of, where the floods would take five days to run off, were carried out?—It would of course. My increased value of the £10,000 is on the basis that it would be freed from floods altogether; and if it is subjected to partial floods, that would seriously modify it.

2728. Are you acquainted with the Shannon?—No, not much. I know the Shannon from beginning to end, but I am not acquainted with the drainage.

2729. You are not acquainted with the winter floods of the Shannon?—Yes; up above the Stock I have seen them.

2730. The Commissioners have had evidence that the winter floods are rather beneficial than otherwise to the flooded land?—That is what I said at the commencement. That is from the richness of the deposit.

2731. That is your opinion?—Yes; and I do not think the floods remain so long on the Shannon as they do on the Barrow. You have two basins in the Barrow, one above Portarlington, that is flooded sometimes three days before it is flooded below Monasteroevan. It takes that time to come down, and below Monasteroevan is the largest area.

2732. Mr. Pitt.—For what length of time does the water remain on the land up above Portarlington in a bad flood?—Sometimes for months.

2733. Partially the whole winter?—Yes. When I commenced the Barrow, at the latter end of October, a flood came down below Monasteroevan, and I was not able to work till the following May. I could not go through the lands.

2734. Mr. Barry.—Can you tell us what the practice is about revealing lands improved by drainage for taxation?—No, I cannot. It is the Valuation Board that does that.

2735. Mr. Abernethy.—I understand you distinctly to say that the material value of the deposit left by floods is dependent entirely upon the matter held in solution in the river?—Yes.

2736. And therefore it is only locally applicable where it is beneficial?—Yes.

2737. Mr. Barry.—It has been stated to us that if land is flooded by winter floods, certain aquatic grasses are encouraged to grow, and that if the winter floods are removed these aquatic grasses no longer grow, but a better class of grass takes the place of the aquatic plants?—I believe that to be the fact.

2738. Would that be your opinion?—Yes. I know down on part of Lord Deaghda's estate they had beautiful meadows some eight or ten years ago.

2739. Mr. Pitt.—That is in the neighbourhood of the Barrow?—Yes. The rich grasses have died away, and a kind of coarse rush has come up.

2740. That is in consequence of increased flooding?—Yes, of increased flooding.

2741. Then you think the Barrow is at present every year silted up, and the floods getting worse?—Yes. I have no doubt that it is.

2742. It has been suggested that some portion of the expenditure on the Barrow should be charged over the whole catchment area?—That is Mr. Haughey's plan.

2743. Would you be in favour of that?—What the Chairman has put to me I agree with, that, if that was sent down water and injured the low land, it has a right to be a proposition, but that would require very careful consideration. For instance, in the case of the Barrow, where the greatest quantity of water comes from is the Shire Kesh Mountains; they do the great injury, and you could not tax them.

2744. If the taxation were in proportion to the valuation of the land and not to the area, that objection would not hold good?—No.

2745. The present value of that land is so small that the tax would be small?—Yes.

2746. The Chairman.—Supposing it was only 6d. an acre, still 6d. an acre would bear a slight taxation?—It would, and the entire of that catchment district beyond the ambit of what I went over should be closely examined, and the improvement put down according to circumstances, because there may be farms there that do not do any injury and that are dry.

2747. Have you studied the question with reference to the sanitary aspect? Do you think, if you drain a district like that, so much saturated with water, it would improve the sanitary condition of the whole population of the catchment area?—I have not the slightest doubt about it. Some mornings when I was out on the Barrow the entire valley would be like a sea, and you would see trees like islands. That was a big putting over the entire district, and that of course mud creates milder and chill.

2748. And create malarial, and keep the climate much cooler, and altogether be injurious to health?—Yes.

2749. Have you any suggestion you could make with reference to the drainage of this district, or of any other you may be acquainted with?—I have none at present.

2750. Mr. Barry.—Have you any figures about the total valuation of the catchment area of the river Barrow?—No. They have that at the Board of Works.

2751. Mr. Pies.—Do you think it would bear a charge of 6d. in the pound on the valuation?—I was asked that question by Mr. Haemul, and I told him it should be examined for that purpose. I knew there would be a terrible outcry against it from the lands where the people would say they did not want it. It is a most difficult thing to get people to consent to those things. In one farm a man would tell me he was ruined by the floods, and another man in the next farm would say he never saw it new him according to his idea. In the town of Mountbelleh my attention was directed to some cottages that were saturated, and yet every second cottager used to say the floods never come into them, and the others that they were destroyed.

2752. The Chairman.—I presume it is not unnatural they should object to taxation, although they may be greatly benefited by the expenditure involving the taxation?—It is not, and lately I find that the landlords are just as particular about it as the tenants, because every one of them told me that I came in contact with, that they would not consent to anything being taxed except what was in their own hands.

2753. The land of which they were the occupiers?—Yes.

[The witness withdrew.]

Mr. Richard A. Mitchell called in and examined.

2754. The Chairman.—I believe you are the Secretary of the River Barrow Navigation Company?—Yes.

2755. You produce a letter from Mr. La Touche, the Chairman of that Company, which you wish to put in?—Yes.

2756. Perhaps you had better read it, and then, as you go on, if you have any remarks to make, you may do so?—This is the letter:—

"GENTLEMEN,—I would beg to be permitted to lay before your Commission the following evidence in corroboration of the opinion which I expressed before the Barrow Drainage Commission, that the scheme for the drainage of the upper portion of the basin of the Barrow, submitted to that Commission, would be fraught with much danger to the property and interests of the Barrow Navigation Company.

2754. Mr. Barry.—I suppose, if the rateable value is raised on the improved area of the flooded land, that the rates of the whole district would be to that extent increased?—That is the point?—

2755. Yes; there would be a larger rateable area from which to pay poor rates?—But could they alter the valuation?

2756. Mr. Pies.—Can you tell us whether they can alter the valuation?—I do not think they can.

2757. Then you think the valuation for taxation purposes is not altered after a drainage scheme is carried out?—I think not.

2758. Have you any view as regards the taxing of the towns?—No. I understood that medical evidence was to be given about the towns, and I left the towns to the medical men.

2759. Do not you know that portions of some of these towns on the river Barrow are seriously injured?—Yes.

2760. Do not you think, so far as that is concerned, they ought certainly to contribute?—Certainly. I gave that evidence to the former Commission.

2761. Do you think the people in those towns would object to be taxed, we will suppose to the extent of 6d. in the pound on the valuation?—I do not think that the houses that are injured would object, but the others decidedly would. The floods in the Barrow at Portlough must interfere with the drainage of the town.

2762. Mr. Barry.—I suppose they also interfere with the access to the town?—I never found that. Just at the bridge, in a high flood, there might be about a foot and a half.

2763. We saw a portion of the road leading to Portlough, which I should think would be a quarter of a mile long.—About a foot and a half of water would be there in a flood.

2764. The flood was all over the road.—At each side of the river bridge. There is another point with regard to the Barrow, and I do not know whether the engineers have directed their attention to it. Going up to Colonel Carden's property towards the direction of Maryborough, from the canal there is a canal supply, about a mile up from the canal, and from that upwards, I suppose for two miles, is injured by that canal supply.

2765. Mr. Pies.—Is it that it leaks?—It throws back the water.

2766. There is a weir to stop the water?—Yes. The engineers might remedy that by taking the supply further up. I should like to add, that if the plan of protecting the land from floods by embankments some distance in from the river be adopted, the improved value of the land between the embankment and the river would be considerably reduced.

"Since giving evidence before Lord Castletown's Commission, I have had an opportunity of reading some of the reports furnished to the Board of Works, which all tend to prove that the drainage of districts, along the upper portion of rivers, has been attended by largely increased flooding of those districts below the portion drained, as the following extracts will prove:—

"Extract No. I. From Report of Mr. Bateman, C.E., to House of Commons on Floods in the Shannon, May 1863:—

"There can be no question that the drainage which has been carried out in the basin of the Shannon has materially facilitated the escape of water from the drained districts, and has thus increased the rapidity with which the water rises in the Shannon, and the volume of water in times of flood. It would appear also, as a necessary consequence, that the river is

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Fryer, M.P.

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rendered more liable to summer floods than it was previously.

"Extract No. II. From evidence of W. T. Mulvany, Esq., before Committee of House of Lords. *Re the Brown River*—

"The observation of our principal engineer is, that the discharge has been increased during the progress of the works, from 178,000 to 268,000 cubic feet per minute."

"Extract No. III. From Report of the Commissioners of Public Works, June 30th, 1884—

"Owing to the additional body of water sent down to the Shannon by the operation of the arterial and other drainages since the works of the Shannon Improvement were undertaken, it becomes necessary to increase the width and depth of cuttings through some of the important shoals."

Here I should like to say that there are several reaches of the river Barrow of less dimensions and less fall than the channel Mr. Manning stated would be necessary to cut above Ashy. About Levinstown—I think I drew your attention to it on the way down the river—is a regular shabby, all aqueous matter, and nothing to relieve the flooding.

2770. What are the duties of the Barrow Navigation Company as regards keeping the river in order?—There are no duties laid down by their charter. They are merely supposed to keep it navigable,—to have a channel,—and they always do maintain a navigable channel.

2771. You claim rights over it, do you not?—We do not claim riparian rights, nor exercise them either.

2772. According to one statement in this letter, you claim the right to grant water privileges to mill-owners?—The charter is an extraordinary one. It is a grant of the soil of the river Barrow, from bank to bank. The Company hold everything between the two banks.

2773. You claim the right to give these rights to the mill-owners?—Yes, we do—the water-power.

2774. Then, if you claim the right to do so, does not that right involve obligations to keep the river in proper order?—Well, I suppose if we levied a rent for the water-power, which we do not do, it would be so.

2775. Whether you levy a rent or not, if you claim the right, you must necessarily take on yourselves the obligation. Is not that so?—I am not in a position to say whether it is or not.

2776. Mr. Pies.—You claim a right to all the water that comes down to you at Ashy?—Quite so.

2777. Do not you think, as you have a right to use the water, there ought to be a duty on your part to see that the water is able to get down to the sea?—Still, it does get down. It is blocked to a certain extent.

2778. You say yourself that the channel is not in the condition in which it ought to be?—We have three miles of canal at Ardara. The old river we have nothing to say to, from Ashy downwards. It is not our property there.

2779. I thought you said that by your charter you were given the water from bank to bank?—Yes—of the navigation channel.

2780. When you make a canal alongside of the river, do you say that you have no rights over that portion of the river that is running alongside the canal?—We do. We say good-bye to them there.

2781. The Chairman.—Does it strike you that it may be due to your diverting the water from the river to an artificial canal, that those shabbies, as you call them, have come into existence?—Whether it is, or is not, I suppose that was the look-out of the Government when they granted the rights.

2782. There is no doubt that that water is abstracted from the Lower Barrow?—Not a doubt. That reach of the river, from where the canal leaves it where it is canalised for three miles to Levinstown, which goes below Sir Anthony Weldons's, is in a shocking state. We

have nothing to say to it there. In fact, Sir Anthony Weldons exercises rights over that portion, and preserves it, and proceeded against the former secretary of the Barrow Navigation for shooting over it.

2783. That may be. In all cases where a river is canalised, or canals or reservoirs are made, the owners of the land have the fishing and shooting rights over the water. I do not think that touches the question. You have abstracted a certain amount of water, which has caused the river to fill up with an accumulation of sand and so on, and, as you say, it is more like a shrubby river than a river. Then the question is, whether the rights you claim do not involve the duties of keeping the river in order?—Even where it should leave the navigable channel?

2784. Mr. Pies.—Supposing that in one of these cases where the canal and the river are running alongside each other, some one attempted to put up a mill on the river, and take water from the river for the purpose of that mill, and run it out in the river below, should you consider yourselves entitled to interfere with him?—I should suppose we would.

2785. Mr. Barry.—Have you got the words of the charter with you that you were alluding to just now, as giving you the water and the soil?—The soil and water thence."

2786. Is there anything in the words of the charter to distinguish between those parts that are navigable or made for navigable purposes, and those that are not?—No, there is not.

2787. The Chairman.—Will you let us have the charter?—I will do so—I will send you a printed copy. I should like to say, while on that point, that at the special reach I allude to there is a weir where we leave the river, and that turns the water into our channel, so that they could not in any way injure the navigation, no matter how they tampered with the reach of the river below, until we join again below Levinstown.

2788. Mr. Pies.—Is that weir ever drowned?—I could not say. On the other hand, all the old residents there admit that the river is in a much better state to carry off the water than it was in its original state before it was made navigable. There were many places where homes crossed by floods. Then the letter proceeds—

"Extract No. IV. From Report of G. S. O'Leary, Esq., C.E., to the Commissioners of Public Works, 1883—

"Before the Lough Neagh works were commenced the winter discharge from the lake at Toome was calculated to be 347,638 cubic feet per minute, and that at the Cutts as 400,000 cubic feet per minute. It is with reference to the above quantities that the improvements in the river were designed, and when the works are completed the discharges will, I am sure, become more uniform. In the meantime, however, instead of the discharge at Toome being 347,638 cubic feet per minute, it has been measured this last year several times, and the result has shown an average in time of floods of 560,000 cubic feet, or 60 per cent. more than it was stated to have been before our works commenced. At the Cutts, instead of 400,000 cubic feet as before quoted, the maximum observed discharge in February 1882 was 657,795 cubic feet, and in December last it reached 823,144 cubic feet per minute, being more than double the quantity measured to have been discharged in former years."

"Extract No. V. From Report of S. U. Roberts, C.E., to the Commissioners of Public Works, 1883, Tinsborough District, County Galway.

"The works in this district were resumed on March 1st, but were suspended on October 10th, as no additional funds were available for their completion on the scale which the increased floods, caused by the improved drainage of the country discharging its waters into this country, rendered necessary."

"I am also informed that on the completion of the Mullaker River Drainage Works, a tenant holding land on the lower portion of the river brought an action

against the Trustees for injury sustained through increased flooding caused by above drainage, and obtained a verdict and substantial damages.

"The floods in the River Barrow in the existing state of the river are occasionally of such a nature as to cause serious inconvenience to the navigation, and should they be increased in anything like the proportions given in some of the instances I have quoted, not only would the navigation of the river become impracticable,

but serious injury to the works and buildings of the Company would probably ensue. At present the possible altitude of floods is considerably diminished by the fact that the waters in the tributaries of the Barrow have always subsided before the flood in the main river has reached its highest point, as may be seen from the following data obtained during the flood in October last, by the lock-keepers of the Company at the locks from Carlow downwards:—

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HEIGHT OF WATER ON LOWER SILLS OF LOCKS DURING FLOOD, OCTOBER 1886.

	HEIGHT OF WATER.										
Lock.	14th Oct.	15th Oct.	16th Oct.	17th Oct.	18th Oct.	19th Oct.	20th Oct.	21st Oct.	Observations.		
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.			
Carlow, . . . . .	7 5	9 3	10 1	10 2	10 6	10 8	10 9	10 5	{ Great Ouse and Don rivers affect this level.		
Rathfriland, . . . .	7 0	8 6	9 4	9 3	9 2	9 9	8 6	8 0	{ Rathfriland river affects this level.		
Upper Ballyfin, . . .	7 6	8 3	9 5	9 7	9 5	9 3	9 3	9 0	{ Avon and Gowna rivers affect this level.		
Lower Ballyfin, . . .	7 9	7 9	8 5	8 5	8 0	8 0	8 0	7 10	{ Shannon river affects this level.		
Ballyvaughan, . . . .	9 8	10 0	10 0	10 7	10 7	10 4	10 4	10 2			

"From this return it appears that the tributaries discharged their maximum floods on October 16th, and that the Barrow flood was at its maximum height at these locks on 20th October. The rainfall was general on the 15th and 16th October, when it rained almost incessantly for thirty hours."

"It is noticeable that in that table the heights of the rise and fall are more sudden above Carlow than below Carlow, which would, I think, go to prove that if the height of the water is increased by the lower tributaries, it is then maintained at that height by the flood from the Barrow coming down a few days later. We had one flood since that, and the agent at the lower portion of the navigation reported that it had been the highest flood in that portion for years, whereas it was at least six inches lower at Carlow. It was a flood subsequent to the October flood, so that I suppose the rainfall on that occasion was rather partial on the lower districts. The letter continues:—

"It is unnecessary to point out that, should the rapidity with which the water is discharged into the main river be so much increased as to cause the highest point of the flood to occur simultaneously with the highest point of the floods of the tributaries, serious damage would be certain to accrue to the works and buildings of the Barrow Navigation Company, and the acres, meadows, and mills of its principal customers."

"I would also beg to call your attention to the fact that while Mr. Manning, C.E., on the completion of drainage works, estimated for a maximum discharge at Athy of 400,000 cubic feet, this estimate was, according to Mr. Hammond, C.E., exceeded by 56,000 cubic feet in a flood which he measured in September 1879."

"In conclusion, I would submit that the interests of this ancient Company are well deserving of your favorable consideration. Although these interests are not so valuable at present as when the milling trade in Ireland was in a more flourishing condition, still, should a revival of that trade take place, the immense water power of the Barrow made available, and granted free of all charge to mill-owners by the Company, and the very low rates of freight on corn and corn produce fixed by the Company's charter, would render this navigation not only a very remunerative

property to its shareholders, but also of great benefit to the community at large.—I am, gentlemen, your obedient servant,

(Signed) PETER LA TOURNE,  
Chairman, R. N. Navigation.

2788. The Chairman.—This 56,000 cubic feet excess of Mr. Manning's estimate of 400,000 cubic feet cannot be due to any improved drainage of the upper river?—I do not know when the Rathfriland drainage was carried out—whether it was previous to that year or subsequent to it.

2790. Have there been since the estimate of 400,000 cubic feet by Mr. Manning any drainage works carried out?—It was in September 1879 that Mr. Hammond measured this flood when it was 56,000 cubic feet in excess of what Mr. Manning estimated.

2791. Then between the two had there been any drainage works completed?—I am not in a position to say. I do not know when the Rathfriland works were carried out.

2792. Then I think we may fairly assume that this 56,000 cubic feet of extra flood-water was not due to any drainage works on the Upper Barrow?—It only turns on that point when Rathfriland was done.

2793. It turns on the question of whether Mr. Manning's estimate is correct?—Yes.

2794. I have got here the returns you kindly sent to the secretary, of the total receipts and expenditure of your Company. What is the total capital you have expended on the navigation?—£260,000 is the nominal capital. Then there was a great deal more advanced by the Government.

2795. How much?—I cannot quite remember. I think it was £4000 to the mile for forty-two miles, which would be over £240,000.

2796. Mr. Pies.—Have you any figures to show that?—It is mentioned in the report of Lord Castle-town's Commission.

2797. The Chairman.—Are the net receipts in that report?—No, they are not.

2798. Mr. Pies.—Has any of that money lent by the Government been repaid?—No, it has not, and it was not to be repaid. It was advanced by the Commissioners of Inland Navigation.

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2729. By the Irish Parliament?—It was in 1791, so that it would be the Irish Parliament.

2800. Do you pay any interest on that?—No. It is nominal capital.

2801. The Chairman.—It was a gift, in point of fact?—Yes. I think the outlay was £370,000. I have got the receipts and expenditure here, but that will not give the net receipts.

2802. This has been taken out in the office. Subtracting the expenditure from the receipts leaves the net result, and I find that, whereas from 1865 the net receipts gradually went up from £1300 to at one time £4700, they have been since gradually falling, till they got down to £1100, £1200, £1700, and then lastly to £2211.—That was the net profit.

2803. Mr. Pitt.—Did not you meet with some exceptional loss in one particular year?—We did.

2804. Not in that last year?—No. It is in December 1885, I have here two half-year's printed accounts. For the half-year ending December 1885 the profits were £1040—about £2000 for the year.

2805. The average is about £2000.—The average is about £2000.

2806. How did they fall so low as £900 in that particular year?—Perhaps that is the half-year.

2807. The Chairman.—No; it is the year 1885. The net receipts fell to £931 in 1885.—The tolls that year were £2100, and the traffic receipts were £7764. That would be a gross total of £9864. The expenditure was £8931, and the net receipts £1773. By a clerical error, the expenditure was put at £2800.

2808. The gross receipts gradually rose from £14,500 to £19,400, and then they have been gradually falling, till the last year they were only £2864.—Yes.

2809. Mr. Pitt.—What is the cause of the falling off in the receipts?—They fell from 1878, when the Grand Canal Company took over the traffic; so that it is toll we receive instead of traffic for half the river.

2810. The Chairman.—The result is that there is so much diminution in your receipts?—Yes. But there is a smaller staff kept up.

2811. Mr. Pitt.—When did the Grand Canal Company take up the traffic?—About October 1878.

2812. Are the receipts given here after deduction of the payment of some charge to the Grand Canal Company?—Previous to 1878?

2813. Since then?—We paid them previous to 1878, and they paid us subsequent to 1878.

2814. Why should the mere fact of their having the management of the traffic lead to a falling off in the receipts?—Owing to the tolls being reduced in 1883. They got a reduction of about 40 per cent, and the rates of freight were also reduced by my Company in 1878.

2815. Why were they reduced?—They made application and fought the point. I do not know the reason that they were reduced. I suppose they were considered a little high, owing to the state of trade.

2816. They thought by reducing the charges they would increase the trade?—Evidently so.

2817. Has it not resulted in an increase of trade?—I do not think so.

2818. What is the nature of your trade? Who are the people that give you the traffic?—Grain and coal. Millsters, mill-owners, and coal merchants.

2819. The coal and the grain they bring into their mills come over your system?—Yes; and husky goes out again or not.

2820. The malt goes out again?—Yes; it passes over the navigation twice.

2821. Is most of your traffic composed of that?—Yes; the bulk of it is grain and coal.

2822. Were there mills along the Lower Barrow built since the Navigation Works were made?—I believe so, except the Andree Mills, which I believe were there before.

2823. Mr. Barry.—Is the bulk of the traffic con-

vayed by the Grand Canal Company through traffic to Dublin?—All conveyed by them to and from Dublin.

2824. Is the bulk of it through traffic?—It is a very little local traffic.

2825. They take the tolls, I suppose, or do you receive the tolls?—We receive tolls.

2826. From the freighters?—No.

2827. The freighter pays to you?—The Canal Company charge a through freight to their different customers, and then they pay the tolls to us weekly.

2828. Then they receive the money from the freighters?—They do, which embraces tolls and all charges.

2829. The Chairman.—In other words, they have become the carriers from Carlow to Dublin. Instead of the Barrow Navigation Company being the carriers from Carlow to Athy, they have ceased to be carriers, and are merely toll receivers, the Grand Canal Company being the carriers all the way. That is the explanation of it, is it not?—Yes. They have through booking.

2830. Mr. Pitt.—How do the Grand Canal Company make the profit over your navigation?—I do not know.

2831. Is the charge they make to the person who gives them the traffic greater than they pay you? Do they keep back a percentage?—Decidedly.

2832. That would account for the receipts falling off, because your expenditure on the other side is less. You have not the expenses of the keeping up of the canal. Are there the receipts after you have paid them whatever is their proportion of the charge?—We pay them nothing. They pay us.

2833. Then those are the net receipts after they have paid themselves what they are allowed?—That does not take in the figures at all. There are simply the tolls we charge.—Is. 9d. on grain to Baginbown from Athy. The whole freight would be 8s. 6d.

2834. Who do you get the Is. 9d. from?—The Grand Canal Company.

2835. Is it not their boat?—Yes. The boat arrives at the first lock at Andree, and the boatman must show his manifest to the lock-keeper. The lock-keeper is the collector of tolls, and makes up the returns at the end of the week, sends the head office an estimate of the toll that has to be levied on the Grand Canal on the traffic passed over our water from the Monday morning to the Saturday night.

2836. Previously to the Grand Canal working the traffic, did not you carry on the traffic on your own behalf?—We did, and paid them toll on their navigation.

2837. But the charge from when they enter your canal at Athy down to Baginbown which you made then would be greater than the charge you now make?—It would.

2838. Because it went in your boat?—Yes; so that that increased charge would appear in the traffic receipts. That shows why our traffic receipts have fallen.

2839. Your receipts are apparently less, although the traffic may be as great?—The traffic is about the same. The tolls have increased.

2840. The figures you have here do not give the expenditure?—Yes; here is the expenditure column and the receipts column. The traffic receipts, up to 1878, were the largest part of the total. They have fallen off, and the tolls have increased.

2841. The total tolls and traffic together in recent years is considerably less than the tolls and traffic before?—Yes; because we have not the traffic receipts.

2842. The Chairman.—Let me put it in this way. The traffic receipts fall off, and the expenses fall off. The expenses when you were carriers yourselves were £14,500; then you ceased to be carriers, and became toll receivers only, and those expenses fell from £14,500 to £7966. The net result to the navigation ought to have been pretty much the same?—Yes.



2843. Mr. Price.—Is there more traffic up the river than down the river?—They are about equivalent; the tonnage is about half and half.

2844. Half comes to you over the Grand Canal?—Yes, about that.

2845. When you have traffic, is that carried on still on your own boats?—It is down to Waterford.

2846. What you call traffic is what goes down the river, and is altogether over your water?—Quite so.

2847. Is that carried on your own boats?—Yes.

2848. This is what comes to you over the Grand Canal, and is now carried in their own boats?—Yes, with the exception of a few private traders, who carry a few hundred tons—a very small thing.

2849. The Chairman.—Do you know what dividend the Grand Canal Company pay?—It was at the rate, £1, 12s. 6d., the last half-year—per annum.

2850. Has their traffic fallen off, do you know?—It has increased on our water this last half-year. There was an increase of about 2500 tons, and there is an equivalent falling off in our traffic to Waterford to that amount.

2851. Mr. Barry.—Do you know what they pay on the whole year?—I think it is about 59s. per cent. per annum.

2852. Do you know what the total charge per ton for grain and coal is from Carlow to Dublin?—6s. 6d. or 7s.

2853. The Chairman.—What is the distance?—Sixty-eight miles.

2854. Is that for coal?—That is for grain.

2855. What is it for coal?—6s. 6d. or 6s. 9d. I should be very glad to send you in the figures.

2856. We shall feel obliged if you will, and if you will send the rates that are charged from, say, Waterford to Carlow, to Athy, and to places on the Grand Canal, including Dublin?—I will send a schedule of the rates charged between Dublin and Carlow and Carlow and Waterford, with intermediate stations.

2857. Not the tolls, but the rates charged as carriers?—Yes.

2858. Mr. Barry.—Is the navigation between Bogusstown and Pinhookstown carried on entirely in the river, or is there any navigation cut?—There is a short canal.

2859. It is mainly in the river?—It is mainly in the river.

2860. And between Ballyfin Upper and Ballyfin Lower, is the navigation there carried on in the river or in the cut?—It is half and half—half canal and half river.

2861. That is a distance of six miles?—No, only a mile and a half.

2862. It is given here by Mr. Price as six miles?—Upper Ballyfin is the next lock to Lower Ballyfin.

2863. You have read several passages about the increase of floods caused by drainage?—Yes.

2864. Does it occur to you that much of the drainage allowed to is what is known as thorough drainage, that is, drainage of land as distinguished from river improvement?—No, it had not, because as little had fallen into the Barrow from Athy downwards.

2865. The quotations you made were from reports of Mr. Bazeman and others as to increased rapidity of water flowing down the river. I do not know whether it has occurred to you that many of those allusions may be to the drainage of land as distinguished from the improvement of rivers?—Arterial drainage, in fact.

2866. Thorough drainage as distinguished from arterial drainage?—If during the maximum flood at the present time there is anything like 456,000 cubic feet per minute flowing past Athy, do you suppose that the improvement of the river above Athy will increase that quantity?—That is one point. I believe it will.

2867. You think it will be more than that quantity?—We do.

2868. If not more than that quantity, you would be in the same position as you are now, in the case of maximum flood?—We should not, according to Mr. Howard. There is one point I should like to mention, and I do not think it has been taken up as far as I know by this Barrow drainage scheme, that is, whether it has been contemplated that our navigation works may be filled up with sand when the upper channel is cleaned up. Recently the Duke of Leinster cleaned out one of the tributaries, the Grease river, and it has given us a lot of trouble. He sent down a lot of silt, and we have been dredging for six months, in about 60 yards of the navigable channel, and so fast as the stuff is taken up it is filling up again. He has cleaned up the Grease, and it has let go all the sand held by aqueous motion, and it is all coming down.

2869. Have you made any claim in respect of that?—No, we did not.

2870. The Chairman.—Do you think you have a claim?—I think we have not. We have a sand trap at the mouth of the Grease, which has been neglected, and if we had cleared out this sand trap, as we intend to do next season, the sand trap would have caught all the sand. The question is whether provision has been made for that in Mr. Manning's scheme.

2871. Mr. Barry.—Did your company make the sand trap?—Yes.

2872. It was not the Drainage Commissioners?—No.

2873. The Chairman.—That has occurred from that sand trap not having been kept in proper order?—In this case it has. I am merely bringing it up as a point, because if the channel above Athy were cleaned up and all that water that is accumulated there is taken away, and there is nothing to hold the sand, it will all come down with a rush and fill the channel.

2874. Mr. Barry.—How long have you been in charge?—Only a year and a half.

2875. You do not know whether the depth of water in summer for navigation purposes is less than it used to be?—It is just the same, because I took soundings for the last Commission. I went up one evening last July twelvemonth, and took the Lovelocks canal as a standard. I took the depth there, and it was exactly the same as when Mr. Mulvey took it in 1853, and having done that I took the soundings over the very shoals he had sounded, and they were exactly the same; in fact, in a few cases they were a few inches more.

2876. You think that there is now a greater depth of water than formerly?—Yes.

2877. In extreme summer?—Yes. I have had a very good two summers since I went there.

2878. The Chairman.—What is your experience as regards the competition between the railways and the canals?—I do not think there is any competition between them. It is not the wish of the Railway Company to compete with the Canal Company for certain traffic. For instance, grain and coal they do not wish to enter into competition for with them.

2879. They charge higher rates?—They do.

2880. Much higher?—With the Barrow Navigation there was an understanding which has lapsed now, which was that the Railway Company's rates should be 10 per cent. over the Barrow rates. That agreement has fallen through, and the Railway Company apply the same rates to where they touch our stations as they do where they run where there is no canal at all.

2881. What has been the effect?—I do not know what the effect will be, because the change has only lately been made.

2882. It is only lately they have reduced their rates to your charges?—It is only lately that that agreement has lapsed, and that they apply the same rates where our stations touch their stations, as to where there is no canal or navigation.

2883. You have not had an opportunity at present of judging the effect of that?—No, as regards to this; that their rates are still from 4 to 9 per cent. over the canal rate.

Jan. 5, 1858.

Mr. Richard A. Mitchell.

Jan. 8, 1897.  
Mr. Richard  
A. Hatchell

2884. Does that apply to the Grand Canal also?—  
It does.

2885. Then practically there are differential rates  
in favour of the canal all the way from Dublin to  
Carlow?—There are.

2886. And probably to Waterford?—Probably. I  
am sure they are to Waterford.

2887. Perhaps you will look at that?—It is a very  
high rate to Kilkenny.

2888. Have you got the railway rates?—I have not  
got the railway rates.

2889. But you say they are from 4 to 9 per cent.  
higher?—From things I have heard formerly, I am  
sure we carry much cheaper than the Railway do.  
May I add that, with reference to the agreement I  
mentioned—that lapsed—with the Railway Company,  
I was asked, Did I think it would have any effect  
either to benefit the Railway or the Canal Company?  
I do not think it will affect either; because I asked a  
mill-owner the other day, "Do you think, if our rates  
were exactly the same as the Railway Company's, you  
would go to the Railway?" He said, "Oh no! because  
you come alongside our mill, and discharge everything  
there; and even if the Railway rates were lower than  
yours, we would go to you by preference." In fact,  
the Barrow Navigation Company are so strongly of  
that opinion that they have decided not to reduce  
their tolls.

2890. That would apply to the mill-owners on the  
Navigation?—And the mill-owners.

2891. What about the town of Carlow?—The

Carlow merchants are all alongside the river too; and  
the Gas Company. So that it is to their convenience  
also.

2892. But the coal merchants can usually get  
wharves at the railway station?—They have all their  
premises you see alongside the river.

2893. But if coal has to be carted from the strand  
wharf to the houses, say in Carlow, it can just as well  
be carted from the railway station to the houses.  
However, you think that the same rates would practi-  
cally keep the whole of the local traffic of Carlow on  
the Navigation, as it has been up to the present time?  
—I do, as far as grain and coal are concerned. I  
think what are called "sundries" might go to the  
Railway Company.

2894. Mr. Pies.—Almost all your traffic is with  
people who are along the margin of the river itself?—  
Yes.

2895. The Chairman.—Not altogether; because,  
take the town of Carlow for instance?—For heavy  
goods.

2896. Mr. Pies.—General traffic for Carlow is by  
rail; it is only these heavy articles that you get?—  
Yes.

2897. The people who bring the coal and heavy  
things of that kind to Carlow have their warehouses  
and stores down by the river?—Yes.

2898. In fact, they had the river there before they  
got the railway, and these they got their places of  
business into the neighbourhood of the river, and don't  
care to move out of it?—That is so.

[The witness withdraws.]

*Adjourned to Monday at eleven o'clock.*

## TWENTY-FIRST DAY—MONDAY, JANUARY 10TH, 1887,

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At 34, MERRION-SQUARE, DUBLIN.

Present.—*Sir James Alport* (Chairman); *James Abernethy, Esq.*; *J. W. Barry, Esq.*; *J. T. Finn, Esq.*

*Mr. Samuel Usher Roberts* called in and examined.

2900. The Chairman.—I believe you are a member of the Board of Works?—I am.

2901. And before you became a member of the Board you were employed by the Board as an inspector of works?—I was employed as, what was then termed, District Engineer, and entrusted with the carrying out of drainage works under the Arterial Drainage Acts.

2902. You have seen this list of questions 1—I have.

2903. We will ask you to give us evidence upon the salient points in these questions. I see you have marked certain questions upon which you desire to comment. Will you, without further preliminary examination, take the questions upon which you think you can give the Commission some information?—Yes. The importance of arterial drainage to Ireland is the first I have marked. With reference to the advantages to land relieved from flooding by arterial drainage, I think it may be considered that land may be divided into three classes—first, deep alluvial soils, which derive almost immediate improvement by being relieved from flooding; there is a second class, which consists of light clay and mucky soils overlying retentive subsoils, which derive little or no benefit from relief from flooding until they are further improved by agricultural operations; by under-drainage and deep tillage; and there is a third class, which consists of out-way bog, which is very extensive in some districts, and requires very considerable expenditure in levelling and draining after being relieved from flooding by arterial drainage works. Those two latter classes of land require, in addition to relief from flooding, very considerable subsequent expenditure in order to give them the full advantage to be derived from the arterial drainage; whereas the alluvial land comes into increased value immediately upon being relieved from floods.

2904. Do you find that the subsoil below out-way bog is pretty generally of one character?—Is it a stiff clay?—No; it in many cases consists of marl; in some cases it consists of drift; in other cases of a kind of stiff retentive clay. My experience in Ireland has been that we find land occupies very slow indeed to take advantage of arterial drainage works in following the improvement of those two latter classes of land and the result is that in many districts you will find, on such lands comparatively speaking, little improvement resulting from arterial drainage.

2905. That is in the case of stiff clay and the unimproved out-way bog?—Yes; but where alluvial soils have been relieved from floods there is at once a large increase in value. I have always been of opinion that valuers do not put a sufficiently high tax upon lands of that character, and have been too heavy upon the other two classes of land.

2906. Have you anything further to say under that first head?—I see you have a sub-division here under the head of pasture. The fact is, nearly all the lands in the drainage districts that I am acquainted with are under pasture; there is very little arable land that is subject to flooding. Land occupiers are slow to till land that is subject to flooding. Of course there are headlands and margins to the flooded lands which are arable, and which suffer great injury from what may be called saturation to within a few inches of the surface. Those

lands are no doubt benefited by the lowering of the water in the main channel of the rivers, and of course are liable to a charge for improvement.

2907. The question here is what improvement to pastures is effected by arterial drainage, in the growth of grasses or what?—The improvement to pasture land by arterial drainage is, with the exception of those rich alluvial soils that I have referred to, a very slow process indeed, if it is not aided by skilful agricultural operations; because the natural drying-out of all the aquatic plants and the growth of better grasses in their place is a work of time; and it takes many years to effect any important alteration in those respects.

2908. How many years, in your opinion?—I think it would take from five to seven years.

2909. The full time allowed by the Act of Parliament?—I think it would, before that change takes place, so as really to amount to an improvement in agricultural value, if not aided by artificial operations.

2910. Mr. Barry.—Before you leave the question of thorough drainage let me ask you this. Do you think that the slowness to take advantage of the arterial drainage to which you have alluded is due to the relation of landlord and tenant?—Oh, no; my experience in connection with drainage works was long before any difference arose between landlord and tenant. I have been now for thirteen years on the Board of Works; my experience of drainage works was before that period, and up to that time there was no difference between landlord and tenant.

2911. Do you think the Land Act will have a tendency to shorten or to lengthen the time within which advantage will be taken of arterial drainage?—I do not think it will have any material effect. I think the slowness to take advantage of it arises from the natural indolence and indispension of land occupiers to take advantage of facilities for improvement.

2912. Do you think recent legislation, giving the tenant power to borrow money for improvements, will have any effect on that question?—Well, it may. At any rate it places the means within the tenant's grasp for carrying out improvements, which before he had not; and as far as that goes I think it may facilitate their carrying out improvements.

2913. You have alluded to the relief of land from floods. Would you limit that to total relief or partial relief?—Not total relief from all floods in any case. I should always guard myself by stating that there are rainfalls which yield floods which it would be too costly to provide for. Floods under exceptional circumstances must take place, and will always take place. I think there are few instances where it would be wise to incur the expense necessary to relieve lands from exceptional floods.

2914. You mean the expense would be too great for the end obtained?—Yes.

2915. Mr. Abernethy.—In addition to the time you have named—five to seven years—when the better class of grass would grow up, I suppose there must be considerable expense incurred on the pasture lands in order to secure a crop of better grasses?—Of course if an occupier incurs expense either by tillage or top-dressing, the transaction would be more rapid; but I think that under ordinary circumstances in the course of from five to seven years on good lands a

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great improvement will take place in the character of the pasture without any expenditure of capital by him. The quantity of grass yielded if the land was meadowed would certainly be less, but the quality would be very superior.

2915. Mr. Pies.—Would you apply that statement you have just made to those low-lying lands along the Shannon?—No; they are of that rich alluvial soil that would immediately come into an improved condition if relieved from flooding.

2916. Well, but we are told by some of the witnesses that the winter flooding of the lands in the immediate neighbourhood of the Shannon is beneficial—I have no doubt it would be if the floods could be controlled, and only winter floods were allowed on those lands, you would then have them in the highest state of productivity to which they are capable of being brought. I think winter floods increase their value considerably; that is, they give a very much larger yield of coarse hay, which is of greater value than the smaller yield of a better quality of hay would be.

2917. Would you tell us the period of time during which you were engaged as District Engineer under the Board of Works?—For about eighteen years—from 1846 up to about 1863.

2918. Then you have not had the carrying out of works or the oversight of works under the second Act of Parliament?—No; it was under the first Act of Parliament—8 and 9 Vic.—not under 26 and 27 Vic. c. 85. Under the latter Act, I may state, I was employed by the Board of Works as their Inspector. I held the meetings that were required under that Act, in order to hear objections to the projects that were submitted for the approval of the Board.

2919. The Chairman.—How long did you hold that office?—Up to the time I was appointed Commissioner of Public Works, in 1873.

2920. Mr. Pies.—Will you tell us the districts in Ireland in which you acted as District Engineer?—I, first of all, was engaged on three districts in the county of Louth—the Ards, the Glyde, and the Fane. Those districts were only partially executed when I was transferred to the west of Ireland to carry out the works in the Lough Corrib drainage district and in other tributary districts to that lough.

2921. The Chairman.—Do you know in what condition those drainage districts now are which you yourself were engineer of many years ago?—I do not know what state those three districts I have referred to in Louth are in. On the completion of the drainage districts that I carried out in the west of Ireland I was appointed by the proprietors in those districts their engineer to look after their maintenance, and up to the time I left the west of Ireland I was in charge as engineer of those districts.

2922. And you kept them in an efficient state?—Yes.

2923. What state are they in now?—I cannot say; that is thirteen years ago.

2924. Not either by inspection or by reports?—Or by reports. Perhaps I am wrong. I should say all the drainage districts, with two exceptions—there were two districts which were not put under any charge, and which were neglected.

2925. That is the point. You know of your own knowledge that they were neglected?—I do.

2926. Mr. Pies.—Were some of those works carried out in the west of Ireland carried out as relief works after the famine?—They were; almost all the works I was engaged upon were carried out during the famine as relief works.

2927. Carried out by the Board of Works?—Yes.

2928. I suppose it was because they were relief works that only a small proportion of the cost has been charged on the improved lands?—That was one reason, and an important reason—that there was a very large expenditure incurred in executing them as

relief works, which would not be necessary had as relief been necessary. One instance I recollect in the Turfagh-More district, where, I think, I had at one time to employ 3,000 men, and where I do not think an ordinary contractor would have employed 300.

2929. We have had some evidence that there are in that very neighbourhood further districts requiring to be drained at the present time, but they tell us that they would not pay directly, and that without a Government grant they could not be carried out?—Yes, I am aware of that.

2930. Would it be your view that the lands of Galway would not repay directly the cost of draining them?—Yes, I am certain of it. The districts you now refer to are: one near Tuam, called Dunmore—

2931. Yes, that is one?—Another in the same neighbourhood called Moiviva, and another Ballin-darry, a portion of which is Colonel Nolan's property.

2932. Then, in your opinion, those particular works would cost more than you could charge against the improved lands?—Very much more—probably double.

2933. The Chairman.—We have had considerable evidence that with regard to many of the drainage districts of Ireland, after they had been completed, for want of attention on the part of the Boards and the authorities they have, many of them, gone back almost to their original state, and that unless some system is adopted, by which a constant and compulsory supervision is established, much money will be spent in vain, because they are so much neglected. Is that your experience?—Yes; I quite concur in that opinion. That is my experience.

2934. Then, have you considered at all what remedy—what improvement, for instance, in the constitution of the Drainage Board or the supervision by the Public Works Department, of those districts, after the money has been expended, should be adopted?—Well, I think that all drainage operations ought to be, in some sense, under the supervision and control of some central department or Board, which would, without incurring direct responsibility, have the power of enforcing the execution of such works as are necessary in carrying out the improvement in the first instance, and in its subsequent maintenance.

2935. There has also been urged upon us the necessity for forming one Board, say for any particular district or drainage area, such, for instance, as the Upper Barrow, that all the tributaries in that district should be under one Drainage Board, with a surveyor, like a county surveyor of the roads, and that he should send in his reports, and that the Board of Works, or this central Board, which you suggest, should have the power to inspect it and to call attention to it, or to enforce proper maintenance after the works are completed. Do you agree with that?—I do, strongly.

2936. It has also been stated before us that such a river as the Shannon, for instance, is too large for one Board—the entire river—that it should be separated into districts, taking certain tributaries, for instance, on the Upper Shannon, and, perhaps, the Middle Shannon, and the Lower Shannon, as distinct Boards. Have you ever turned your attention to how the whole drainage area of the Shannon should be divided?—I cannot say that I have turned my attention particularly to the details of it, but I have done so sufficiently to say that I think it is quite feasible.

2937. And desirable?—Certainly. It is quite too large an area to entrust to one Board. It ought to be subdivided, and it is quite feasible to do so.

2938. Mr. Barry.—Would it be your opinion that you should subdivide the main stream of the Shannon, or merely in the sense of having subsidiary districts?—Well, the Shannon is a peculiar case. Looking at the connection of drainage with the navigation there,

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one would almost think that the main channel might be subject to some kind of Government control and supervision altogether, and that the tributaries might be divided into sub-districts and placed under the charge of Local Drainage Boards.

2939. That is the present condition of affairs, is it not?—It is, somewhat.

2940. Mr. Abernethy.—Would it not be desirable, supposing the Shannon were divided into districts, that each district should have the charge of one section of the main stream, and the tributaries relating to that portion of the stream?—I do not quite follow you.

2941. If the Shannon was divided roughly into the Upper and Lower Shannon, that the Board which has the charge of the district of the Upper Shannon should also have the charge of the tributaries leading into the Upper Shannon?—Certainly.

2942. Inasmuch as the tributaries have such an effect on the main stream?—Certainly.

2943. The Chairman.—How would that consist with your idea, that the main channel of the Shannon should be entirely under the control of a Government Department of the Drainage Board, if the tributaries and the Upper Shannon were united into one Drainage Board?—So far as the main channel is concerned, I look upon that as a main watercourse, both for navigation and drainage purposes. I think that ought to be under the charge of the Government solely, but that all outside that should be subdivided into districts, and placed under the control of Local Drainage Boards.

2944. If you attempted to put the Government control over the main channel, and then the district Drainage Boards also over the channel, you would have conflicting jurisdictions?—Yes; I did not quite follow Mr. Abernethy. You would then have divided responsibility.

2945. Mr. Finn.—At the present time, if there are defects in the carrying on of the maintenance, persons interested in the locality have a right of appealing to the Board of Works to have it inspected; have they not?—They have.

2946. But you have not the initiative?—No.

2947. Would you propose that you should have the initiative?—I would. I would propose that the Central Authority should have inspecting officers, that it should be their duty to make annual or periodical inspections of drainage works, and report to the Central Authority upon their condition; and that if maintenance works are found to be necessary, the order of that Central Authority should be imperative on the Local Board at once to proceed with the execution of the necessary works.

2948. Have you considered how the funds are to be provided for those necessary works?—I think the Central Drainage Board should be a Government establishment; but, of course, all the cost of the works executed in the district would be charged on the lands.

2949. Would you make it compulsory without the consent of either occupiers or owners?—I would in every case of maintenance.

2950. Without the occupiers or owners having any voice?—I only refer to works of maintenance.

2951. That this Government Board should not have extensive compulsory powers to force a drainage scheme upon the district?—No, certainly not. They should have power to enforce maintenance works, but not power to enforce works of construction in the first instance. I would give them every aid, and guide them in every way I could; but I would leave the determination to proceed with works of construction optional with them, and I would make them responsible for the execution, under due control.

2952. Mr. Finn.—Would you give the Central Board control of the original design?—I would. In that respect I think a very great improvement

might be made on the present system. I think if the proprietors or occupiers of land in a district are desirous of carrying out a drainage scheme for the relief of their lands, the proper course for them to pursue should be to present a memorial to the Central Authority, stating their desire to proceed with that work. I think the Central Authority ought then, through their own officers, to prepare a preliminary report, setting forth in general terms the scheme which, in their opinion, ought to be carried out; this I would call a sketch or preliminary report, not entering into details, but giving as full and accurate information with reference to the project as possible, and stating briefly the terms upon which the Central Board would be disposed to sanction the execution of that work. Then I would let the owners and occupiers of land, who are desirous of carrying out the work, on consideration of that report, and seeing clearly what was likely to receive the ultimate sanction of the Drainage Authority, proceed to prepare all the necessary plans and schedules, and other information with a view of carrying out their work. In that way they would be relieved from the onus of incurring an expense in connection with the initiation of a project, until they saw a fair chance of carrying it through successfully.

2953. Do you think that such a project would meet with the support and approval of the Executive in Ireland—talking into consideration the fact that it would entail a very considerable preliminary expense upon the Government?—That, I do not know. I am speaking entirely from an outside point of view, not as an official.

2954. But, I presume, you know the views of the Board of Works. Do you think they would recommend such a system as that?—I am not prepared to say.

2955. Mr. Barry.—It has been suggested to us that the first application for such a thing as you have indicated should be accompanied by a deposit of money of a limited amount—say £50. Would it be your view that that deposit should take place, or that the preliminary report should be gratis?—I would rather have the preliminary report gratis. There is always a difficulty in getting money to take the preliminary step in arterial drainage. There is a doubt about its coming back to the person who lodges it. This has often been a complete barrier to the execution of such works. It has been so, even where large landed proprietors have been interested. You have an entirely new state of things existing now. Drainage works can now only be carried out through the occupiers. No landlord would incur liability in connection with drainage works, except with regard to the land that he may have in his own hands. Therefore, I conceive there would be great difficulty in that preliminary step. I think if the occupiers saw a prospect of the work being subsequently approved by the Central Drainage Authority, and a prospect of its being carried out, they might be prepared to come forward and provide the funds necessary for making the further engineering inquiries and valuations necessary, and to consider whether the works should be proceeded with.

2956. In many cases the expenses necessary to lay down a really good proposal are somewhat considerable?—Very considerable.

2957. Do you think it would be possible, on the reception of a merely preliminary report of the nature you have indicated, for the occupiers to come to a safe conclusion?—Well, I should think it would in most cases.

2958. Take the case of the Barrow for example. Would it be possible to come to a safe conclusion on such a drainage as that of the Barrow? Very considerable expense must be incurred before any idea can be obtained of the ultimate incidence of the tax upon the land. Would the preliminary report of a

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board such as you have indicated be of a sufficiently precise nature to guide the occupiers?—I think it would be to go sufficiently near to enable the proprietors or occupiers of land to see whether it would be worth their while to follow it up. I do not mean to say you would be able to come to anything more than an approximate estimate of the cost of the works, or of the extent of land to be improved, or of the increase in value, but I think a man of experience would be able to put generally the features of the project sufficiently before the central board to enable it to decide as to the advisability of proceeding with the project.

2950. The *Chairman*.—Do you think that could be done at a moderate expense?—I do.

2951. Knowing the Barrow, as no doubt you do?—I know the Barrow very imperfectly.

2952. Still you know the extent of the area of it?—Yes.

2953. What in your judgment would be the approximate cost of that preliminary inquiry for the Barrow?—I should not like to say.

2954. £50 or £1,000?—I should say £200 ought to enable an experienced engineer, having the district traversed by assistants, and with the information we have from the Ordnance Survey, to give a sound opinion on the project generally, as to whether it would be worth following up or not.

2955. Mr. *Berry*.—Do you think that money, whatever it is, should be given gratis, whether the scheme proceeds or not?—I would make that part of the duty of the central Board.

2956. But assuming that the work goes forward and a district is formed, that money should not be charged against the district?—I think not. Unfortunately under recent Drainage Acts where land proprietors must send up their plans and estimates and incur all the preliminary expenses, they are so anxious to get work done cheaply that they do not always employ efficient men, and the documents they send up are not very reliable. Proprietors memorialise the Board of Works for authority to form a drainage district. They prepare their plans, sections, and valuation schedules, and so difficult do they find it to raise the money to pay the expense of this inquiry that they do not always employ the most efficient person. They send up these documents. It then becomes the duty of the Inspector appointed by the Board of Works to hold the meetings and to consider objections to those plans and valuation schedules, and also to inspect the district and form his own opinion of it. It very often becomes necessary for him to set about making a very large and expensive revision of the scheme, which is little less costly than doing the work in the first instance, so that in some cases there is a double expense incurred which, in proper hands in the first instance, might have been only once incurred.

2957. At the present time is the cost of that second investigation charged against the district?—It is; and it comes to a very large expense in some cases.

2958. The *Chairman*.—From your experience as a member of the board, of the duties that the board have to discharge, would you recommend that this central drainage question should be remitted to the Board of Works or a separate board?—I would rather see a new board formed in connection with the Irish Government.

2959. Mr. *Pine*.—But if it were made a special department of the Board of Works, with a special head, would not it amount to very much the same thing?—It would.

2960. The *Chairman*.—Have you anything to remark on (a), (b), and (c) in the second part of this first subject—that is, "indirect advantages"—(a) effect on climate of district; (b) increase of rateable value; (c) improved inter-communication by main roads and between farms?—The effect on the climate, no doubt, is advantageous, but that I think is of too theoretical a character to reduce to a money value.

2970. Too remote an advantage?—I think so; but, no doubt, it is an advantage.

2971. Mr. *Pine*.—As regards the increase of rateable value are these lands, after they had been improved, revalued for taxation purposes?—For the purpose of the award do you mean?

2972. No; revalued for the general taxation of a district?—Oh, yes; they are.

2973. How soon after the completion of the work?—I think not for seven years. Sir John Ball Greenough can state that positively, but I have always understood that they were.

2974. Now will you go to question eight, which you marked?—That is the area of contribution. With reference to that I think the system upon which all arterial drainage works should be carried out is what I would call the whole river system, and that is from what I may call the main outfall of any district. For instance, take the main outfall of the Barrow river at or below Athy. All lands along both the main channel and the tributary rivers in that district should, in my opinion, form one district, one entire complete scheme.

2975. And that the whole land in the watershed of the upper Barrow should contribute?—I think, looking at the equity in such cases, that the whole watershed should contribute something towards the cost of the main channel which conveys its waters to the sea, of course such a scheme, however equitable it may appear, would be an extremely difficult one to carry out in this country. A large number of the occupiers of the land would fall to see the equity of charging a man on the side of a mountain with the cost of a portion of the works of the main channel of the river in the valley below him. It would be an extremely unpopular tax, and a difficult one to levy.

2976. Mr. *Berry*.—Would you make that rate compulsory?—I would.

2977. There would be no representation?—Well, I am not prepared to say that exactly. I think a Drainage Board properly appointed would sufficiently represent the watershed.

2978. At the present time I dare say you know that the drainage area, as compared with the improvable land, is about ten to one?—Yes; I suppose it is.

2979. You said that you would treat Athy as the outlet?—At or below Athy. I am not very conversant with the Barrow district.

2980. Below Athy there is a very considerable stretch of river which eventually discharges into the tidal water at St. Mullin's?—Yes.

2981. And I dare say you know very considerable questions have arisen as to the effect on the lower part of drainage operations on the upper Barrow?—Yes.

2982. Does it occur to you that under these circumstances the lower Barrow and the upper Barrow gas drainage district should in some way be put in communication?—I think it ought to form one district so far as the discharge of the floods would be likely to affect injuriously lands or other property along the main channel.

2983. Mr. *Aherne*.—You have not said anything about whether any charge should be borne by the towns within the district of the river affected by floods—whether they should bear any charge in the general taxation?—All buildings and towns tend to discharge more rapidly the water shed, and, of course, on that principle they ought to be contributors towards the cost.

2984. Mr. *Berry*.—Would your idea be that the rate of contribution should be in proportion to the rateable value or the area of lands?—That is a very difficult question. You will find in the watershed basin district some land not worth a shilling per acre, others worth £2. No doubt, land that is worth 5

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drilling on acre yields as much water as land of a higher value; therefore, in that sense, it is the smaller area that ought to pay, not its value, but still it would appear a great hardship to pay the same taxation upon land which is worth a shilling, as upon that which is worth £2. I should be inclined to make it a rateable value. I think on the whole it is less open to objection.

2283. May we take it, therefore, that your idea would be that the lands improvable by the drainage should in the first instance bear their full burden in proportion to the value received, and that the balance of the charge, supposing it were a good scheme, should be laid on the district compulsorily?—Yes, to a great extent. The cost of drainage works might be sub-divided, I think, into three heads. First, there are the preliminary expenses. Of course that would form a portion of the general charge. There is another item, and a very expensive item, is the cost of works, a large portion of which now falls on the land relieved, that is, the cost of rebuilding the county bridges. I think the whole cost of any alteration or reconstruction of bridges on public roads should fall on the baronies or counties. I think it is not unreasonable that they should pay that cost; the work is entirely for the accommodation of the public using these thoroughfares, the county indirectly derives very considerable benefit from the execution of the works, by the increase in value of the land available for taxation purposes, and it would be, I think, but fair that they should bear that proportion of the cost.

2284. The Chairman.—I observe in that answer you make a distinction between baronies and counties.—Because in some counties the entire cost of rebuilding public bridges is levied on the baronies, in other counties it is levied on the county at large.

2285. Would you keep up that distinction?—I would be guided by whatever has been the custom or practice in the county with reference to those charges. I would place it as the county might elect, either upon the barony in which the bridge was situated, or on the county at large.

2286. Mr. Barry.—Then you would have three contributory bodies?—Yes; I would first make the land pay the full value of the improvement to it, that improvement being settled upon and determined before the execution of the works. I do not know that I have said so before, but I think this is an important matter, that the valuation schedules which are prepared before the works are commenced, should be looked upon as documents not subject to alteration afterwards. They should form the basis upon which the award was to be subsequently made. Now, there is great difficulty in dealing with many cases, in consequence of owners or occupiers of land seeking to have valuations altered after the completion of works. I think valuation schedules ought not to be altered. I would charge upon the land the full value of the improvement estimated, at so many years purchase of what the anticipated increase in value was, probably taking it at fourteen or fifteen years purchase. I think that would be a fair sum to charge upon the lands. That would be one item of the cost. Then the second would be the cost of public bridges. That, I think, might fairly go upon the baronies or counties. Then you will have a very large balance in many cases, I am afraid, which must be found from other sources. No doubt the rateable basis might fairly be expected to contribute something towards that, but I am afraid that in a great number of cases the balance would be too large a sum to put upon the watershed.

2287. The Chairman.—And I presume you consider there is no other source left open but the Government?—In such cases I think the projects must fall through, unless Government is prepared, in exceptional cases, to give aid to the execution of such works.

2288. Mr. Stewart.—Under the existing circumstances, although the land rendered fecund being flooded is very limited in area, all the charge falls upon the land?—Yes, at present, except part of the cost of public bridges.

2289. And in many cases the cost is utterly out of proportion to the value of the land when reclaimed?—Quite out of proportion.

2290. Mr. Barry.—You said that there is an increase in the rateable value of the land reclaimed; it would follow that there must be some little difference when a revision is made; and assuming that increase of the rateable value takes place, the whole county would gain an advantage by that increase of rateable value?—Yes.

2291. Therefore would you consider that apart from any rebuilding of bridges or works which might or might not be necessary in certain districts—the county should be asked to the extent of the increased rateable value, to bear some portion of the burden?—I think it would not be at all an unreasonable arrangement, and it is one which I have often thought of. If you increase the value of a district £1,000 a year, there is a property of £1,000 a year that is available for taxation purposes, and looking to the amount of taxation on property in the county, which probably might vary from 2s. to 4s. in the pound, it is not unreasonable that the county should pay the value of that by way of contribution to the drainage works.

2292. Would that increase of rateable value affect Imperial taxation in any way?—With the exception of income tax, I do not see how it would, except very indirectly.

2293. It would be entirely confined to income tax?—I think so. Of course as to a tax derivable from grain which is manufactured into beer and whisky there is indirect taxation there from the excise, but that I think is too theoretical. But as income tax, of course, it would be immediately available.

2294. In the case of the Barrow (simply to get the figures into one's mind) the estimated increase is £10,000 per annum. Would that have any effect at all on Imperial taxation other than income tax?—I do not see how it would have any direct effect on Imperial taxation in any other way.

2295. I suppose such an increase of value might have some effect upon adjoining towns in the way of development of trade?—Yes; no doubt it would. The greater the agricultural value of the district around any town the more benefit it derives; there is no doubt about that.

2296. Mr. Pim.—It also tends to increase the demand for labour, I presume?—It does.

2297. The Chairman.—I think the answer you have previously given rather disposes of this question, 10. By extending the area of the district boards you avoid this conflicting jurisdiction between one board and another, as pointed out in question 10; or rather, you provide for the protection of lower districts from works in the upper district?—Yes.

2298. One board would take care of the interests of both the upper and the lower districts?—Yes.

2299. Mr. Barry.—There is one question so that I should like to ask. Have you any views as to how the main district board, representing the whole drainage of the area, should be formed?—Well, I think drainage boards should be elected by the occupiers altogether.

2300. Do you mean occupiers of the improvable land or of the whole drainage area?—Of the land chargeable for the improvement. I think if you give the central drainage authority a power of reviewing the acts of the local board so as to take care of the interests of all and the interests that the Government have in the work so long as they have money outstanding on loan, there is no fear but that a local drainage board elected by the occupiers would be found a fairly

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efficient board to carry out the works; at any rate it would relieve the Government to a great extent from responsibility in connection with the works.

3003. Yes; but I was trying to follow this out a little. Supposing you form a district, and that district has certain claims upon the whole drainage area in respect to a particular river improvement, and there is another river or subsidiary stream in the same drainage area, which subsequently requires improvement, the board representing the first improvement would not be a qualified board to deal with the second improvement?—No; I understand you now.

3004. And, therefore, there would be no board representing the whole interests of the drainage area?—No; there would not in that case; but my view is that if a drainage scheme is carried out in a district, all the tributary streams, as well as the main river, should form one district, and all the works should be carried out in that one district.

3005. The *Chairman*.—And where independent boards now exist you would consolidate them into one board?—I would.

3006. Mr. *Berry*.—This does make you could form a drainage scheme to deal with the whole of the drainage area there would be some difficulty in initiating the undertaking?—I think it is very important that the river district should comprise all the tributaries in the district.

3007. Mr. *Alcock*.—If the election of the Board is to be entirely in the occupiers of the land, would you place any qualification on the members of that Board as regards position?—Yes; I think there ought to be a qualification.

3008. The *Chairman*.—A somewhat higher qualification, perhaps?—I am not prepared to say, but it ought to be such a qualification as would secure you getting the best men in the district.

3009. Mr. *Pear*.—How would you give the voting power? At present it is in relation to the valuation of the land. A man with a large area of land has more voting power than a man with a small area of land—would you apply the same principle when you give a vote to the occupiers, or would you make them all equal?—No, I would apply the same principle.

3010. Mr. *Berry*.—I should like to follow out that last question of mine. I dare say you may know that in the district of the Upper Barrow there are subsidiary districts which have been formed and which we are told have been successful?—Yes.

3011. Under the new state of things which is suggested it seems to me that there would be a difficulty in dealing with these small areas without forming a Board to deal with the whole. Does it occur to you that there is some difficulty in working that out successfully?—Yes; there is, no doubt, some difficulty. There was the Ballinagun and Kildare districts that had been carried out in the Upper Barrow basin.

3012. We have heard of a good many other smaller districts in one drainage area?—Yes.

3013. And we have been told that on the whole these smaller enterprises have been successful financially?—I have no doubt they have, because they have contributed nothing towards the works in the main channel through the district below to the outfall.

3014. Mr. *Alcock*.—These small districts are in some cases in the principal districts of the watershed?—Yes.

3015. And the improved drainage discharges more water on the lower districts?—Undoubtedly.

3016. And under such a state of things they should be placed also under the general board?—I think they should be placed under the general board. Of course it would be unnecessary that there should be any representation on the drainage board in respect to these districts during the execution of the works in the main district until they are carried to completion; but subsequently, when you come to deal with the maintenance of the works, then I think that members

of these drainage boards ought to be co-operative with the drainage board of the main river scheme for the purpose of maintenance.

3017. Mr. *Berry*.—The idea that was occurring to my mind was this, whether in future it was desirable that there should be smaller districts formed inside the drainage area of a large district; or, whether, supposing certain works were necessary or desirable in the first instance for smaller districts, the main Representative Board of the whole district should be the Executive authority. Would it be your opinion that, looking to the desirability of allowing and encouraging local effort for partial drainage of a district some Central Board representing the whole district should be obliged to take into consideration such local efforts, and deal with them in some way which would not be conflicting with the interest of the whole drainage area?—Yes, I consider that very desirable.

3018. Mr. *Pear*.—Do you think that in this Barrow case it would be fair now to make some change on these two existing drainage districts in the area of the Barrow in reference to the improvement that is to be made to the main stream of the Barrow where their water falls in?—I do.

3019. Do you know whether it was contemplated to make any such change?—No.

3020. Mr. *Berry*.—But such change would fall under the same category as the compulsory rates to which we have alluded before over the whole drainage area?—It would.

3021. Mr. *Pear*.—There are three different rates that you have spoken of. How would you propose that they should be collected? Would you still leave it in the hands of a Board of Works to collect the money from the occupiers—they now collect it from the owners?—First of all the portion chargeable upon the county would be collected by the county collectors in the county as county cess. There would be no difficulty about that. I think that the general rate on the water shed might be collected in the same way as a land tax, through the county officers. I think that the portion chargeable on the lands improved might be repaid in the same way that repayments are now made by occupiers of land direct to the Central Board.

3022. It has been suggested to us that the Drainage Board for the district should be responsible to the Board of Works for the repayment of all this money, and that then the duty of collecting the money from the various parties who were to pay it should be thrown upon the Drainage Board, of course, making use of the county machinery of collection for these general county charges?—I should not be disposed to recommend that. It is not desirable to give to local Drainage Boards such financial duty to perform; it would entail the necessity of their having a staff, and incurring an increased expense. There is no expense now in the repayment; the money is paid to the Board of Works. It is paid through the nearest bank without expense of any kind, and I do not see why the same system should not be adopted in future with reference to the charge upon the land for the improvement. The general charge over the watershed will be a small charge in the pound, and I do not see why that should not be included as a land tax with the county cess, and collected by the county officers.

3023. The *Chairman*.—I think the answers you have given exhaust all the questions we have to put as to the maintenance of arterial drainage works when built?—I think so.

3024. Then, with regard to the last head dealing with navigation, let me put a question to you—assume that this General Board were established, would you put the navigation under the same Board as the drainage?—I think where navigation is connected with drainage, both navigation and the improvement of water power ought to be under the Central Board. There should be no sub-division of authority.



3034. The Grand Canal, for instance?—That is another thing—that is not connected with drainage works. I speak of the Bann, of Lough Corrib, and the Shannon and the Barrow—navigable watercourses which are connected with drainage works.

3035. You would put these navigation works under this Central Board?—Yes.

3036. Mr. Barry.—Have you formed any opinion as to the desirability of owners as well as occupiers sitting on the Drainage Board?—I think an owner would only act on a Drainage Board, in respect of the lands he has in his own hands.

3037. Unless he is sitting qua occupier?—Yes (inter.).

3038. You think he has no interest either in the success or the failure of the drainage scheme?—I think not. I do not think he would take any interest in it.

3039. The Chairman.—And very little, if any, pecuniary interest?—Very little. I do not see what he has; he is merely an absentee now.

3040. Mr. Finn.—Although he may make no profit out of the improvement, is not there a risk that if the scheme be a failure, the cost of that failure will fall back upon him, partially if not wholly, when the rents come to be revised from time to time?—That is that the drainage charge will get precedence of his rent?

3041. No; but is not there a risk that when the revocation of the rent comes, this charge which the tenant is obliged to pay to the Government will affect the rent which he will be able to pay to his landlord? Suppose there is no real improvement made in the valuation of his land and that he has still to pay a charge in regard to the drainage works, will not that charge, upon the readjustment of his rent at the end of the fifteen years, practically come out of the rent that he would otherwise have to pay to his landlord, and reduce the rent that is payable?—It would; but I do not see how his sitting on a drainage board would prevent that state of things arising.

3042. The Chairman.—In other words, in that case the landlord would become the occupier?—The land would fall into his possession.

3043. Mr. Barry.—He would by compulsion become the occupier?—If he becomes the occupier, then of course he assumes all the responsibilities of occupier.

3044. Mr. Abernethy.—Supposing an occupier fails to pay the tax, becomes greatly in arrears, and gives up his farm, would the proprietor be liable for the money due?—I take it the land is liable.—It is the only security which the Government would have for lending the money.

3045. The Chairman.—If the tenant cannot pay, the land naturally reverts to the owners, who thereupon becomes the occupier, willy nilly?—Yes.

3046. Mr. Abernethy.—And is liable to pay the arrears?—Quite so; and there is the importance of such a central authority as will guard against works being carried out which will not be remunerative.

3047. Mr. Barry.—There is one question bearing on that same point: It has been represented to us by some witnesses that the occupier would rather be disposed to welcome the owners on a mixed board—would that be your general opinion?—I think on some estates it might be so. There is no reason why an owner should not sit upon a board.

3048. If elected, you would not deter him from sitting simply because he is not an occupier?—Certainly not.

3049. The Chairman.—And of course you would give the electors power to elect him?—Yes; and I think in a large number of cases where there is good feeling between landlord and tenant, they would much rather see their owners sit on the Board,

having regard to their intelligence and knowledge, as being the best safeguard they would have against incurring unnecessary expense.

3050. Mr. Barry.—I presume that the word owner would comprise the owner's agent?—Yes, certainly.

3051. Would it be your view that any ex-officio member should sit on a Drainage Board?—Yes; I think an ex-officio member representing the watershed or tributary district should sit upon the Board. He might be appointed by the Grand Jury or by the Grand Jurors of the counties into which that watershed extended. Grand Jurors are generally composed of the largest landed proprietors in the county. If you leave the selection of this ex-officio member of the Drainage Board representing the watershed of the tributary district to the Grand Jury they will exercise their power no doubt and select from that particular district a useful man to sit upon the Drainage Board.

3052. The Chairman.—Then you would confine the election by the Grand Jury to one member?—I think so; I think that would be sufficient.

3053. Mr. Barry.—It has been represented to us that there is very great difficulty in getting Drainage Boards, who are charged with maintenance, even to meet?—Yes, great difficulty.

3054. Have you ever considered whether it is as desirable to give any inducement to meet, in the way of a small fee or payment of expenses?—I do not think that would be much inducement. The meetings of Drainage Boards are generally called in the towns in the district to which they go for the purpose of attending Poor Law or other meetings on a day convenient to them. Still it is very hard to get these gentlemen to attend.

3055. Does anything occur to your mind as a way of inducing them to meet?—I think when the maintenance is made compulsory it will secure sufficient attendance.

3056. You mean the power you would give to the Central Authority in Dublin to compel maintenance would bring about the meeting?—I do.

3057. Mr. Finn.—Do the existing Drainage Boards make any report from time to time to the Board of Works of what they are doing?—No; you mean as to the execution of works?

3058. Either that or maintenance?—There is no surveillance whatever over the Local Drainage Boards, with regard to maintenance of works until a difficulty arises and a district is so neglected that it becomes necessary for somebody to intervene.

3059. And then some complaint is made to you?—Some complaint is made; but a district may be for years totally neglected before it comes to the knowledge of the Board of Works that it is so.

3060. Mr. Barry.—At the present time the complainant must be the owner of land?—He must be an owner of land.

3061. Mr. Finn.—Have not the occupiers of land also a right to complain?—Yes, anybody who pays a charge.

3062. The Chairman.—We have had it stated by an occupier of land (whether it is his own land or not we are not quite certain), who came before us last week, that a very considerable amount of damage had been done by the owner of a mill property, first by temporarily raising the weir by planks and ultimately by raising it permanently, until he obtained a right. That right was contested in a court of law, but length of time had confirmed it, to the great injury of the land occupiers above the weir. The gentleman's name was Moore, and he was situated on the river Maine. Do you know anything of that case?—Not much; it is in the county of Antrim, above Randalstown. I recollect examining that district many years ago and the millowners I think, stopped the works being proceeded with. They said "We have a vested interest in the flooded state of the district above the

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mill; and the compensation which they would be entitled to if the mill dam had been removed and the distress drained, was found to be so large that it would exceed the value of the improvement. Those works were never proceeded with; but I do not know any particulars with regard to the mill referred to by Mr. Morron.

3053. But it seems to be a great hardship does it not, then a man in the upper part of a river probably knowing nothing of this enjoyment of rights at a mill weir, should be damaged because length of time gives a right? Would you suggest any alteration in the law or any scheme by which the rights of the owner and occupier can be protected against such invasion?—Well, it may be said in reply to that, why did the occupier permit such a length of time as twenty years to elapse without resisting the encroachment.

3054. It is true that it is open to that remark; but now we are told that it is doing excessive damage to the occupier and must necessarily be injurious also to the upper land—To the extent of, I think he said, 3,000 acres.

3055. Mr. Abernethy.—It was represented that the weir originally was sufficient—but during the summer months, when the water is very low, the weir was not of a sufficient height to give a supply of water to the mill, and therefore the proprietor of the mill had raised the level of the weir, so that he might have during the summer months a sufficient supply of water; and the result is that a much larger area of land is flooded than would have been if the weir had remained at its original height. That appears to be very great hardship!—Yes.

3056. The Chairman.—Yes, very great, because the man stated that he did not object to the increased height in the summer time, but he had no security of the planks being removed in the winter!—It is always the case. There are very few districts in Ireland where the same story could not be told. It was done when mills were of considerable value—now, they are not of much value; it is a hardship, no doubt, unless you lowered the wheel, I do not know how you are to remedy it.

3057. Mr. Barry.—There is no means of dealing with that condition of affairs under the present law!—No, there is not.

3058. It is stated to be that if sluices were put into the weir so that the winter level was retained at the same height as the summer level, the mill would not be damaged and the land would not be flooded. If that were the case no damage would be sustained by the miller, and yet he has the power of preventing it being done!—Yes; but very likely if that were done the effect would be to throw back-water upon his wheel, so that in that way he might be damaged.

3059. It is stated in evidence that that would not be the case, because there is a very sufficient fall in winter time!—Possibly that may be so.

3060. The Chairman.—This is one of the cases against the general maxim, that no injustice can be committed for which the law does not provide a remedy!—Yes.

3061. Mr. Barry.—There is no possibility at the present time of any Central Board doing such work as to put sluices into the weir in question, and pay the damage, whatever it may be, to the mill!—No, there is not.

3062. Supposing the damage were nominal it might be done without any compensation!—It might.

3063. But now the miller can stop the whole improvement!—Yes, because it interferes with his private property. I should think there could be no objection whatever to making some provision enabling a Central Board to deal with such cases in future.

3064. Mr. Finn.—You would give that central authority some compulsory power of doing such a thing as that!—I would.

3065. Then would you have the damages assessed after the thing was done, so that it could simply be tested by what the result was!—I would always have it assessed beforehand if it were practicable.

3066. For the future you would give the central authority power to remove such obstructions compulsorily!—I would.

Adjourned till to-morrow at 10.30.

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## TWENTY-SECOND DAY—TUESDAY, JANUARY 11TH, 1897.

At 36, MERRION SQUARE, DUBLIN.

Present:—Sir James Allport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq., and J. T. Finn, Esq.

Mr. Peter Fitzgerald called in and examined.

Mr. Peter  
FitzGerald.

3067. The Chairman.—I believe you are agent for Lord Dunsaville!—Yes.

3068. And you have had some experience, I have no doubt, on these drainage questions?—Yes, I have had a certain amount.

3069. I think you have had this list of questions sent you?—Yes.

3070. And you have probably considered the various subjects contained in these questions?—Yes; I have.

3071. And it will, perhaps, save time if you will take the questions as they appear in the list, and give the Commission your views with regard to them. Begin, if you please, with the first question—"The importance of arterial drainage to Ireland; advantages to land reclaimed; (a) arable, (b) pasture," and then the indirect advantages, and so on?—Of course the advantages are very great, and I think ought to

pay at least 15 per cent. if properly laid out, but I have applied myself principally to the relations between landlord and tenant.

3072. Shall you confine your remarks to any particular district of drainage?—Yes; the district of Limerick, and Tipperary I know a little of, and Cork. Then I have made a list of what works I know are important to be done in those districts, and, perhaps, I might give you some of them.

3073. I think that will be desirable!—In Limerick, the upper portion of the Midgee and its tributaries; that includes the Greenagh, for which there is a scheme already on foot. In fact they are working at it already, and I am a member of the Board for that district.

3074. As agent for Lord Dunsaville?—Yes. Then there is the Dool and its tributaries; then the Co-

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meagre, which has been begun. There has been a scheme on the Camogue, but it has not been sufficiently carried out, and the maintenance is in a very bad way, I believe—at least what I have seen of it is bad. Then there is the Ballygoole, near Patrickswell, and the Ballinacarragh River. That is all I know in the county Limerick, and in the county Cork there is the Aubeg.

3075. Where is the river you last mentioned—in Limerick?—The Ballinacarragh is close to Limerick. Then there is another river, the Goody, close to Limerick also. That takes in some very valuable land. Then there is the Bear and its tributaries in Tipperary, and in Queen's County, though I do not know it of my own knowledge, I believe there is the Eskine. There is a provisional order already obtained for £50,000 for the Eskine, which has never been gone on with.

3076. Probably it would be as well if you would take those districts in the order in which you have given them, and describe the present condition of the work, and if you can at the same time give the amount expended, and the estimated amount required to finish each district?—I am afraid I am not prepared to give you the amount of expenditure. I merely put down those names.

3077. Could you make the necessary inquiries to get those particulars?—I could, certainly.

3078. Can you tell us the condition of the works in the case of the one where you are a member of the Board?—That has only just been begun, but it is a very useful work—that is the Greenough. That is one of the tributaries of the Maigue.

3079. What is the drainage area of that?—I am afraid I could not tell you.

3080. Mr. Abernethy.—How many acres of catchment?—I am afraid I cannot tell you.

3081. The Chairman.—Not approximately?—I am afraid I could not go near enough to it to be of any use.

3082. What is the total amount to be expended?—It is about £11,050.

3083. And only very little spent at present?—Practically nothing. It has only been begun about a month.

3084. Can you give the acreage of the land flooded and benefited by this scheme?—No, I do not think I can. I can tell you the acreage of the land in which I am interested on Lord Dunraven's behalf.

3085. How much is that?—There are about 160 acres.

3086. Mr. Pim.—What charge is to be made against those 160 acres—do you know?—£50 a year.

3087. For the whole?—Yes.

3088. That is about 6s. an acre?—Yes.

3089. What is the value of that land at present?—It is all at present—in its present state, but it will be very valuable.

3090. What nature of soil is it?—There is a great deal of turf underneath which will sell for fuel, and then the land underneath that will be valuable for farming purposes afterwards.

3091. The Chairman.—When was this scheme started?—About three years ago.

3092. And it started under the terms of the Act of 1863, I suppose?—Yes.

3093. How do you account for the owners occupying a drainage scheme of this kind in the face of the Land Act of 1881?—Well, Lord Dunraven is a very large owner, and had a good deal of influence in that way. He covers a large portion of the area of charge. Mr. Walker is another landlord who also covers a great deal, and those landlords who started it had nearly all the lands in their own hands.

3094. I presume they are large occupiers as well as owners?—Yes, especially Lord Dunraven.

3095. Would that account for the fact of landowners taking it up in face of the Land Act of 1881?—Almost entirely.

3096. Mr. Pim.—Is that 160 acres you have men-

tioned, in Lord Dunraven's own hands?—Most of it; about 50 acres of it.

3097. The Chairman.—What quantity of land has Lord Dunraven in his own hands as occupier as well as landlord?—Between 1,500 and 1,600 acres.

3098. And Mr. Walker?—I could not say that, exactly.

3099. But still sufficient to justify the application as occupiers instead of landlords?—Yes.

3100. Mr. Barry.—Have you formed any estimate of what the value of the land will be after the drainage?—Yes, I have had a report on it, and I should say it would be 25s. an acre at the lowest.

3101. Mr. Abernethy.—And it is now nil?—Now, it is practically nil; in fact it is generally covered with water at present.

3102. The Chairman.—The main question to which you wish to direct your attention is, I believe, the question between landlord and occupier?—Yes.

3103. Perhaps you will go to that subject at once, without taking the various questions in the list?—I think that unless something is done to alter the present law for taxation under drainage schemes, there will be practically nothing done in the future, because landlords will not support arterial drainages, or anything, in fact, that will involve their property, without getting a very definite return, and the return at present, under drainage schemes, would not be definite at all; in fact it would only be a collateral advantage in the security of their tenants.

3104. What alteration in the present law would you suggest?—I would tax the occupiers with most, if not all the rate—the interest of the money—and instead of charging the landlords with the maintenance, which they at present have to bear entirely, I would charge the occupiers, whether landlord or tenant.

3105. They getting the entire benefit?—They getting the entire benefit. That would be a great advantage in another way. I think it would lessen the expense of maintenance, because at present the occupier lives probably on the banks of the river, and his cattle graze all over the banks and do them a great deal of harm. It is no object of his to prevent the cattle doing injury, but if he had to pay for the maintenance of those banks he would take care that there was no injury done.

3106. When you speak of banks, do you contemplate in your drainage scheme, embanking the river?—In many cases it is done.

3107. Where are those banks formed—on the margin of the river?—On the margin of the river.

3108. Not many feet, probably, from the edge of the river?—Close to the edge; within eight feet, perhaps, of the edge of the river.

3109. What is the height of the bank?—That depends entirely on the relative level of the water and the adjoining land.

3110. Mr. Barry.—Can you tell us the greatest height?—I should say seven feet to ten feet is the highest that I know of.

3111. Mr. Abernethy.—These banks are for the prevention of floods?—Yes, and then, of course, the water that accumulates on the land inside those banks is let out by sluice-gates.

3112. By sluice and sluice-gates?—Yes.

3113. Mr. Pim.—Is there much of that sort of embanking carried on in the Limerick district?—There is none going on, except in this Greenough district; but on Lord Dunraven's property there is a great deal of banking. I suppose there are nine miles of bank on the river Maigue.

3114. Was that done by the Drainage Board or by Lord Dunraven?—That was done by Lord Dunraven himself.

3115. For the protection of his own lands?—Yes.

3116. The Chairman.—Has it been successful?—Very.

3117. Mr. Abernethy.—Those banks are on the edge of the river?—Those banks are on the edge of

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the river. When I say it was done by Lord Dunraven I mean it was by his predecessor. He would not do it now.

3118. Is that land in the hands of tenants?—It is in the hands of tenants.

3119. There is no difficulty in keeping the land dry behind the banks by drains?—Little or none. I may mention, as an instance of how careless tenants are when they have to maintain works themselves, that we have to do everything. Lord Dunraven has to keep up those banks or else the tenants would neglect them and let the water flow over their lands.

3120. The Chairman.—You think if they had to pay the cost of maintenance they would be more careful?—Yes, if they had to pay.

3121. Of course as you suggest that the occupiers should be taxed, that necessarily involves a change in the constitution of the Drainage Boards?—Yes.

3122. Because men cannot be taxed without being represented?—No.

3123. And you advocate that these Boards should be formed of occupiers in future?—Not altogether. I think the Board of Works have a great interest in these works and they ought to be represented themselves or have the appointment of a certain number of the Board.

3124. The Board of Works, I believe, now have the appointment of the first Board?—Yes.

3125. But not subsequently. Do they have any representatives on the Board?—They may add to their number.

3126. Not unless they are re-elected at the end of the twelve months?—Yes.

3127. The occupiers, being the payers, would mainly represent the Board?—Yes, I suppose so.

3128. Would you put any qualification upon membership of the Board so as to secure men of position and intelligence?—I would allow the Board of Works to appoint half the Board ex-officio members.

3129. Do you think that that would be a workable scheme throughout all Ireland?—I do not see why it should not, just in the same way as with regard to the Boards of Guardians.

3130. Upon what principle would you do that, not on the principle of taxation and representation?—Not altogether, but still the money laid out the Board of Works are responsible for.

3131. That is the loans?—Yes.

3132. But surely a single representative would be sufficient for that, would it not?—I do not think so.

3133. Not to see how the money is being expended?—He would be there only as an Inspector, and he could only report. His single voice would have no effect on the Board.

3134. But would not that be sufficient. If the attention of the Board of Works was called to any lapses on the part of the Board, the machinery of the Act of Parliament would be such as to enable the Board of Works to take it up?—Yes.

3135. Does not it appear to you an excessive number that they should nominate half the Drainage Boards in the Kingdom?—I do not think it would be practicable unless you had half the Board nominated by the Board of Works.

3136. From what class of men do you suppose these ex-officio members should be selected?—Landlords, agents, and people of position in the country.

3137. Take Lord Dunraven's case—either he or his agent?—I think the ex-officio members ought to be made up of agents and perhaps resident landlords.

3138. Mr. Abernethy.—Would not an efficient engineer or surveyor, similar to the county surveyors, appointed by the Board of Works, for the purpose of inspecting the operations, carrying on the drainage, and to report from time to time to the Central Board, be as effective, or more effective, than the representation on the Board by a certain number of members?—I think that will be necessary as well.

3139. The Chairman.—Would not that be better

alone instead of having half the Board elected by the Board of Works?—I do not see that it would.

3140. Have you had any experience of Boards of any kind where half the members have been elected by an outside body like the Board of Works?—Not on Drainage Boards. The Board of Guardians is similarly elected, but that is not by the Board of Works of course.

3141. Mr. Pies.—Is it not a fact that the ex-officio Guardians are very bad attenders of the Boards of Guardians in the country?—I am afraid they are.

3142. Is it not the fact that the present members of the Drainage Boards, who are elected altogether by the owners, attend very badly also?—They do not attend well.

3143. It is now more or less their direct interest; but hereafter their interest in the matter would be quite indirect if the tax or charge were altogether paid by the occupiers?—Yes.

3144. Is not there a risk that these ex-officio members, supposing them to be appointed by the Board of Works, would be very lax in their attendance on the Boards?—I dare say; but it means a good deal of expense to many and inconvenience to many members of Boards to attend.

3145. They have to go considerable distances?—Yes.

3146. The Chairman.—Would you recommend payment?—I think they ought to have their expenses paid at any rate.

3147. Out of what fund?—On the maintenance.

3148. As part of the expenses of maintenance?—Yes.

3149. Mr. Pies.—You would give them only the cost of travelling expenses for going there?—Yes. I would not give them more.

3150. You would give them no fee for attendance?—No. I think an officer ought to be appointed, or a department in the Board of Works, to look after the drainage districts of the country if it was proposed to extend the facilities at all. If the work was supposed to be getting larger I think there ought to be a special department for it.

3151. The Chairman.—A special department for the drainage?—Yes.

3152. Mr. Barry.—In those instances you gave just now of embankment river, where the tenants you say do not take the trouble to repair the banks, are the rents of those tenants fixed under the Land Act for fifteen years?—No; they have been fixed by valuation.

3153. Are they fixed over a term of years?—No; they are yearly tenants; but of course that is equivalent to a lease for ever you may say now.

3154. I want to gather this: supposing the banks break, and the land becomes submerged, would the tenants still have to pay their rent?—If the landlord chose to enforce it; but then they could go into the Court at once.

3155. Although by their own neglect the banks had been broken?—Yes.

3156. Mr. Abernethy.—How long has that nine miles of embankment you referred to been executed?—I should say about thirty or thirty-one years.

3157. Has it been found effective all that time?—Yes. There has been a deal of money laid out every year. I suppose it costs £50 a year to keep it in order.

3158. For the nine miles?—Yes.

3159. What does that arise from? Do the tenants allow their cattle to stray on the bank and tread it down?—No; it is principally from storms. When there are storms, and the wind blows from a certain point, the floods rise very high.

3160. Between the banks?—Yes. It is a tidal river, and if there happens to be a storm, and a high tide at the same time, it breaks down the bank occasionally, and that costs us money to repair.

3161. I do not think you give us the maximum height of those banks?—I said from seven to ten feet.

3153. Mr. Barry.—That is a tidal river, I gather I—Yes; that is the Maigue.

3153. How far does the tide flow?—It flows right up to Adare; that is eighteen miles.

3154. Mr. Pica.—This is below Adare?—This is below Adare.

3155. Mr. Abernethy.—Then these banks are between Adare and the Shannon?—Yes.

3156. Mr. Pica.—Are these banks on the margin of the river or some distance back?—On the margin of the river; not more than forty feet, I suppose, at the outside, and as a rule they are about eight feet, or perhaps ten feet, from the river.

3157. How wide is the river there?—The river is, I suppose, thirty or forty feet wide between its own banks; of course varying in width.

3158. Mr. Abernethy.—Of course there is a considerable head of water against those banks during floods. The river rises very high at floods backed up with the tide?—It goes almost to the level of these banks.

3159. Supposing those banks had been set back a considerable distance on each side from the margin of the river, so as to allow a wider space, would that tend to decrease the damage done during floods?—I do not think so, and it would take away a great deal of valuable land.

3170. It would take away a portion, no doubt?—I think by raising the banks a little more it would meet that better; in fact Lord Dunraven has in contemplation the raising of those banks. He is thinking of borrowing a loan from the Board of Works to raise them up to two or three feet.

3171. And widening them also?—Yes; widening the bank itself.

3172. Mr. Barry.—Do these banks go right away to the Shannon?—Yes.

3173. In the margin of the Shannon itself embanked?—In some cases there have been slob lands taken in and banked. Mr. Waller, of Castle-town, before the meeting of the Maigue and the Shannon, has taken in a large quantity of land.

3174. I presume these banks of the river Maigue join the banks of the reclamation of the Shannon?—No; that is a good deal further down. There is raised ground near the meeting of the two rivers.

3175. Naturally high ground?—Yes.

3176. And the banks are joined on to that raised ground?—Until they meet the raised ground.

3177. Mr. Abernethy.—Does the injury, which the banks suffer during floods, arise from the floods overtopping the bank, or from cutting away the face of the bank?—Almost always overtopping the bank.

3178. The banks are not sufficiently high?—No; they are sufficiently high for all ordinary purposes, but it is only in cases of flood they give way occasionally.

3179. Mr. Barry.—Do you get a discharge from the back drains at low water?—Yes.

3180. At all times, even when the river is running in flood from freshets?—Sometimes the discharge is not equal to take away the amount of water that has accumulated, but that is only for a time.

3181. To what depth is the back drain carried below the surface of the land; to what depth are you able to carry the thorough drainage?—I should say about five feet where it meets the sluice gate.

3182. Then I suppose the back drains is deeper further away from the sluice gate?—Not always, because the land runs flat for a very long way.

3183. Mr. Abernethy.—It is very flat land there?—Very flat about that river.

3184. The Chairman.—The fall of the river is slight, being a tidal river for eighteen miles?—Very slight.

3185. What is the fall per mile?—I could not tell you that.

3186. Mr. Abernethy.—The current is very sluggish?—No; not very.

3187. During the time of high water?—The current is up when the tide is running.

3188. Mr. Barry.—Do you know what the differ-

ence between high water and low water spring tides is?—I have never looked into that.

3189. Mr. Pica.—Is it not considerable in the Shannon?—It is.

3190. More than in other places?—Yes; I know it is supposed to be, but what it is exactly I do not know.

3191. The Chairman.—At high water spring tides how many feet of tide have you at eighteen miles up?—I do not know exactly.

3192. Mr. Pica.—Are there any legal means of imposing a penalty on tenants who injure the banks of these rivers?—I know the Board can proceed against anyone.

3193. That is, the Drainage Board can?—Yes, for actual injury.

3194. Is it an inexpensive and prompt mode of procedure? How could they proceed?—They have to proceed at the Quarter Sessions.

3195. The Chairman.—What would constitute a claim against the occupier; supposing the water overtops the bank, that would not be his fault?—No; of course not.

3196. If the banks were eroded very much by the current, that would not be his fault, would it?—No.

3197. Upon what ground of neglect or damage done could the occupier be proceeded against?—For cattle injuring the banks, or for cutting away, perhaps, the neck trench, or toothing the neck trench.

3198. At the back of the bank?—Yes.

3199. Mr. Pica.—I think you said sometimes they interfered with the sluices?—No, I did not say so; but they do. I have known them to put a piece of wood into the sluice to let the water back to their cattle.

3200. Are there any means of imposing a penalty for that, do you know?—It would be very hard to assess the damage.

3201. But it would be a penalty—not a question of damage?—I do not think there are any means at present, and I do not think there is anything to meet a case of that sort.

3202. Do you think there is any change in the law in that respect required—for wilful damage, or breaking down banks to let cattle get at water, or anything of that kind?—Yes; I think something in excess of the actual damage ought to be imposed, but I have not thought that matter over.

3203. Do you think Quarter Sessions the best mode of dealing with that?—No; I think it would be better to deal with it at Petty Sessions before the magistrates. Then, of course, the engineer would have to attend to prove the damage.

3204. Do you think if the tenants were themselves the direct contributors to the outlay, and they were also putting representatives on the Board, it would be easier to impose penalties upon tenants who injured the drainage works than it is now?—There is a great deal of prejudice among people of that class. They have no, or very little, idea of fair play or justice, and I think you would have a great deal of difficulty in that way, but otherwise I do not see why it should not be so. The engineer would report the matter, and prove the damage before the magistrates, and the magistrates would have to deal with it.

3205. Mr. Barry.—How are damages brought to the knowledge of the engineer?—If there was an inspector under the Board of Works it would be his duty to find that out.

3206. Do you mean a resident inspector?—I think so. I think that would be very necessary.

3207. To penalise the banks?—Occasionally, and to get information.

3208. The Chairman.—Have you any other observation you wish to make?—I wish to suggest that the Board of Works should advance money at a lower rate of interest, if possible, by extending the time of repayment.

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3290. Both a lower rate and extension of time?—Yes, in order to be able to repay at a lower rate.

3291. What is the rate now to the Board of which you are a member?—Five per cent.

3292. That is to provide for the extinction of the debt in thirty-five years?—Yes.

3293. How would you have that extended?—I should leave that to the Government to do the best they could—to extend it if possible. The money is lent under Lord Ashbourne's Act for the purchase of land at 4 per cent for forty-nine years. Perhaps it would be possible to advance it at the same rate. Then if the occupier pays the whole interest those improvements would belong to him if there was a fair rent fixed.

3294. At the expiration of the tenancy?—Yes.

3295. Have any of the tenants in your neighbourhood taken advantage of the Land Act of 1881?—Very many in the neighbourhood, but very few on Lord Darnley's estate.

3296. What, in your opinion, would be the position of landlord and tenant at the expiration of the fifteen years, as respects drainage, the occupier having paid all the costs? If your scheme is carried out that the occupier is to pay the annual cost both for the extinguishing of the debt and also for the maintenance, what would be the relative position of the two at the end of the fifteen years?—The improvements would belong to the tenant, giving the landlord credit for the undeveloped increment of the soil, and I would allow the tenant a very liberal percentage on his outlay.

3297. Would it not be a question, the tenant having paid all the cost, whether the unearned increment did not belong to the occupier altogether?—I do not think so, because it is at the option of the landlord to reclaim that land himself.

3298. I am assuming that the occupier does the whole?—I think the landlord ought to get credit for the land.

3299. You think that the occupier's advantage has been no great during the fifteen years that he has been simply repaid?—Not on that ground, because the properties of the land which have been developed by that drainage belong to the landlord, and no matter of fact the tenant would be simply repaid in most cases in the fifteen years.

3300. What is the general opinion as to the position of landlord and tenant at the expiration of fifteen years, and as to the claims the occupier makes?—Under the Land Court it has been held that the improvements belong to the tenant who has paid 5 per cent for improvements, although the money has been borrowed with the credit of the landlord; but that is not my opinion, and it has not been the opinion of every Court. They have varied.

3301. Then there is uncertainty about it?—Yes, a great deal.

3302. Mr. Barry.—Supposing such an improvement as arterial drainage were treated as an improvement under Lord Ashbourne's Act, what would be the position of the tenant at the end of the fifteen years?—I hold that those improvements would belong to him, as I say, giving the landlord credit for the undeveloped properties of the soil.

3303. Follow that out a little more. Supposing a man has been paying £19 a year, for fifteen years' interest he would have spent £150?—He would have spent £300 at 5 per cent.

3304. He would have spent £150 and interest?—Yes.

3305. What would be his position as an occupier when he wanted to have his lease renewed?—He should have credit for the £150 and interest in the new rent.

3306. The Chairman.—Having reaped the benefit you say of 25s. an acre for a certain portion of his tenancy. When the drainage works are completed you say the increased value of the land would be 25s. per statute acre per annum?—Yes.

3307. The tenant pays 7s. per acre during the fifteen years?—Yes.

3308. And that implies that he has had the benefit of 18s. per acre during the period?—That is his venture.

3309. What other interest would he have in what you have termed the unearned increment?—Of course, in fixing the rent at the end of fifteen years, supposing that the landlord went in for an increased rent, he would get the full value of those improvements, whereas the tenant would be still liable for the interest, the time not having expired. In fact the tenant would be charged double for the improvements which had been made through him.

3310. That would be by increased rent and the annual tax?—Yes; the annual repayment.

3311. Mr. Abernethy.—Supposing at the termination of his lease the occupier owed a considerable sum of money for taxation he had not paid, and supposing that he left the farm altogether, would the landlord be liable for the debt due for taxes?—Whoever was in occupation.

3312. He would be occupier at once and be liable?—Either the landlord or the incoming tenant ought to be liable for it, and I think it would be very good security, if the work was properly done in the first instance and maintained.

3313. Mr. Pien.—Therefore if the drainage work is a success you have improved the security of the landlord for the land?—Yes.

3314. But supposing it turned out a failure, would not the converse hold good that where there was a charge upon a tenant for the repayment of principal and interest, at the end of the fifteen years' term, when the rent had to be re-adjusted, there would be a probability in that case that the landlord's rent would actually be reduced?—Yes; it is quite possible and quite probable.

3315. Then you think that, under existing circumstances, the fact is the decision of the Court would give the tenant the benefit of the improvement, but that the risk of loss would be with the landlord?—The tenant would have the risk of loss during the time he was in occupation.

3316. But when you come to the re-adjustment at the end of a fifteen years' term?—Yes, I see that; but I do not see how you could avoid it.

3317. No suggestion has been made by which you can avoid it?—If you do not tax the landlord you cannot do any more.

3318. Mr. Barry.—The fact is, you tax the land?—Yes; and for the maintenance of those works I think the area ought to be extended. I would tax the whole catchment basin (as I think it is called) of the district.

3319. The Chairman.—Make it our Board?—Yes.

3320. Now, as to the qualification for the members of that Board, who would be occupiers—would you attach any considerable qualification to that?—I would.

3321. To what extent; it must be an assessment qualification, I suppose?—Yes; and the size of the tenant's holding, I think, would have to be taken into consideration too.

3322. Then you would limit it both in area and in value?—Yes.

3323. To what extent would you limit it?—Well, say a poor law valuation of £35.

3324. That would involve what acreage?—That depends entirely on the quality of the land.

3325. But as a rule?—I should say 35 acres.

3326. At £1 an acre?—Or, perhaps, a little more.

3327. £35 assessment qualification?—Yes.

3328. You would not go beyond that?—No; I think not.

3329. Mr. Barry.—When you talk of the whole catchment area in the instances to which you have been alluding, would you call that whole catchment area the catchment area of the river Maigue, to which these other streams are tributaries, or are you speaking of the catchment area of each individual stream?—I mean each individual scheme or drainage district. For instance, the Greenagh district takes in

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all its own catchment basin. I would tax all that, but I would not tax the catchment basin of the Malgue.

3253. That eventually falls into the Malgue?—It does.

3254. Supposing the Malgue requires improvement, then the catchment area of the smaller stream would be included within the catchment area of the Malgue, would it not?—And charged double.

3255. I want to follow the thing out to see where it leads to?—Yes.

3256. The Chairman.—The question is whether, as the one naturally falls into the other and would perhaps involve the improvement of both, the two ought not to be under one Board?—Certainly.

3257. You said the very reverse of that before. You think that the two in that case should be under one Board?—Certainly.

3258. In fact the Malgue and all its tributaries should be under the control of one Board?—Yes.

3259. And you would not extend that below where the Malgue falls into the Shannon, I suppose?—No, I think the larger the district is in reference to one river, that is including the tributaries and the river the more effectual it must be.

3260. Mr. Barry.—Have you formed any idea, in the neighbourhood with which you are acquainted, of what price it will pay to reclaim land at—at what expense per acre, taking it as capital cost?—I do not think you can reclaim much over £7 an acre.

3261. You think that up to £7 an acre there is a chance of its being remunerative?—Yes.

3262. Mr. Pim.—As the £7 an acre it would be 7s., and you say the land is worth practically nothing, while afterwards it is worth 25s. an acre?—Yes, but then I was not talking of arterial drainage when I said £7 an acre.

3263. Mr. Barry.—I was talking of arterial drainage—I was wrong.

3264. Mr. Pim.—You say it is worth spending £7 an acre on thorough drainage at times?—Yes.

3265. Mr. Barry.—Do you mean thorough drainage in addition to the arterial drainage or the total?—In addition it would have to be, because the land would require a great deal of outlay after the arterial drainage had been effected in itself.

3266. My question was directed to the arterial drainage. Could you tell us at what price you think approximately, in the district with which you are acquainted, it would pay to promote arterial drainage irrespective of the subsequent cost?—Well, that varies so much. For instance, that land of Lord Dunraven's which I told you would be increased probably in value to 25s. per acre hereafter, is, perhaps, above the average. It is certainly above the average in value of improvement.

3267. In capacity for improvement?—Yes. It is a very hard thing to say.

3268. You cannot give us any idea on that point?—No.

3269. I am limiting my question to the land with which you are acquainted, in the neighbourhood of which you have been speaking?—Of course, on that land it would pay to expend a great deal more, and we shall have to do so in the course of time.

3270. Mr. Pim.—Then in the case you have given us of these 160 acres will you, if the arterial drainage is carried out, have to go to further expense in the way of thorough drainage to make that land worth the 25s. an acre?—Certainly.

3271. The Chairman.—What would be the cost of the subsequent thorough drainage per acre?—I should say at least £6 an acre or £7.

3272. Then you think the arterial drainage would cost per acre £7?—Yes.

3273. And the thorough drainage another £6 or £7, making £13 or £14 altogether?—Yes.

3274. Of course, if it is improved 25s. a year it might do so?—And of course we shall get a considerable quantity of turf out of it.

3271. Is not there a considerable quantity of land with regard to which such a cost as that would exceed its value?—That is 14s. an acre—I hardly think so.

3272. Mr. Pim.—As a rule the land in the county Limerick is rich land, and therefore it would bear a higher expenditure than land in many other parts of Ireland?—Yes.

3273. Mr. Abernethy.—What is the nature of the subsoil under that turf land you speak of?—It is gravelly. Then I wish to say something about the collection and recovery of the maintenance rate. I think that might be more easily recovered, or at a less expense, by an ordinary process at Sessions, the only evidence necessary being the certificate of rate, signed by the chairman.

3274. The Chairman.—What process would you suggest for the collection of this tax. There are two collections at present. There is the collection of the loan and interest, and also the collection of maintenance. How would you propose the maintenance to be collected?—The maintenance, by the engineers in the same way as it is at present.

3275. The same as the county cess, or how does the engineer collect?—There is a maintenance rate struck at the meeting of the Board every year, and the engineer applies to the landlords along the stream for the amount of their taxation.

3276. Hereafter you would have to apply to the tenants?—Yes.

3277. Mr. Pim.—Then you have suggested that the maintenance rate should be spread over the whole catchment area?—Yes.

3278. In that case it would be small sums to be collected from a great number of persons?—Yes.

3279. The Chairman.—How could the engineer do that?—If there was an officer appointed for inspecting the districts, it might be collected in his office, I should say.

3280. Have you considered at all whether it could not be collected in the same way as the county cess?—Yes.

3281. Could it be collected by the same individual?—It could of course; but I think the tenants would pay better to the Board of Works if they paid into the Bank of Ireland, or through the engineer, or through the inspector's office. I think distress lands encumbered to the view in a collection of that sort. They pay the interest to the Board of Works for money they borrow much more regularly than they do their county rates. For instance, when a tenant harvests money himself from the Board of Works, he pays it very regularly. He knows he will get no time for payment, and if he does not pay it he will be sold out.

3282. They are very strict?—Yes, the tenants are afraid of that, and they pay more regularly.

3283. There is more indulgence in the collection of the county cess than by the Board of Works?—Yes.

3284. Mr. Barry.—I think you said you would recommend that the local engineer should collect?—Or the local inspector from the Board of Works.

3285. As a representative of the Board of Works?—Yes.

3286. Mr. Pim.—You mean to say he would collect in the name of the Board of Works, as mortgagees in fact of the tenant's farm?—Yes.

3287. And the fear that the Board of Works would come down on him induces him to pay the Board of Works in a way he would not pay the county cess collector?—Yes.

3288. Mr. Barry.—In your evidence where you have alluded to acres throughout, were you alluding to statute acres?—It is all Irish acres in my part.

3289. We are to take the whole of your evidence as referring to Irish acres?—Yes.

3290. Mr. Pim.—Then Lord Dunraven's 160 acres are Irish acres?—Yes.

The witness withdrew.

Jan. 15, 1872.

Mr. Toler B. Garvey.

Mr. Toler B. Garvey called in and examined.

3291. The Chairman.—In what part of the country do you reside?—King's County; and it is chiefly there that I have the experience of arterial drainage.

3292. You have had a list of these questions sent you?—I have seen it.

3293. Do you wish to comment upon any of these questions?—I would say first, that I belong to nine Drainage Boards in King's County.

3294. Perhaps you will name those?—The Branna-Killeggan—the district of the large Branna; the Fobane district of the large Branna; the Derryglavin district, and the Oulshbernard district. Those four districts were drained under the old Acts of 1842—the 5th and 6th Victoria, and the subsequent Acts. These I was the hon. sec., and had a good deal to do with getting up the following districts under the 1863 Act:—The Farnstown, the Silver River, the Derrin Lough, the Boodinarrig, the Frankfort, and the Ballinacraig. They cover an area of about 40,000 statute acres of land that were relieved by drainage at an expenditure of about £150,000.

3295. Were the 40,000 acres included in the four last drainage schemes?—No, that is in the whole of the ten districts.

3296. There were 40,000 acres improved?—Improved and charged.

3297. Mr. Garvey.—Does that represent the cost, or was any portion remitted?—In the recent districts that were done under the 1863 Act—perhaps I ought to have separated them—there was no part remitted, whatever, but under the old Act there were very considerable sums remitted, the £150,000 was only what was charged to the districts.

3298. The Chairman.—Perhaps, on this point I may ask you what was the total catchment area of those ten districts?—That I could not exactly say—I am afraid I could not tell you that—I could make a little calculation if it was of importance, because I think I have the final awards in nearly all these districts, and the schedule to the final award gives them all.

3299. The first four districts are under the Act of 1843?—Yes.

3300. They have been finished many years?—They have—some of them were not finished until comparatively lately. The works were suspended for a long time, and then resumed.

3301. What condition are these drainage works in now?—They are all in maintenance and kept up.

3302. Thoroughly well?—As well as they could be under the present condition of things.

3303. Are the Boards attentive?—Yes, the Boards are in active operation.

3304. Do they meet frequently?—They meet once a year to strike a rate, and to receive the engineer's report—there is an engineer appointed for each district.

3305. In case of any neglect at any part does the engineer report to the Board?—Certainly, the engineer is responsible for the maintenance of the district, and for the whole thing.

3306. In your opinion the works are well maintained?—They are—fairly maintained.

3307. We have had considerable evidence to the effect that after the Boards have once been formed, many of the works have been allowed to go back to their original state?—That has been so in districts where the Drainage Boards have not struck a rate every year, but in the case of the Boards that I am connected with, the rate is struck invariably every year and expended. If it would be the right time for me to say it, I think there should be an improvement in the system of maintenance.

3308. We will come to that presently. Then will you take the advantages to land reclaimed—both arable and pasture?—The advantages that have been derived from arterial drainage to the arable lands I do not think have answered the expectations of the

promoters of the drainage works at all, inasmuch as the main channels as a rule are not deep enough to give a proper outfall for thorough drainage.

3309. The jurisdiction of the Drainage Boards does not extend to the main outfall?—Certainly not; their duty is to keep the works in the same state that they got them up in after the final award has been made—that is their duty, and a very difficult duty it is.

3310. While upon that point—to depart from the order of the questions for a moment—is it your opinion that these Drainage Boards should be consolidated and extended so as to take the whole catchment area of any particular district, and that it should be all under one Board and one control?—I do not think so. I do not think that any improvement would be made by decreasing the local interest.

3311. But you say that in consequence of the lower part of the outfall not being deep enough, or sufficient to carry off the flood, it is not so effective?—I was speaking of the main channel within the district. The general impediment is a mill, and it is so deep within the district as it is possible to make it—generally speaking.

3312. Would it not be advisable to extend the jurisdiction of the Board to the main channel?—At the present moment I am speaking of the main channel.

3313. But the Drainage Boards have no control over the main channel, you say?—No, I do not say that. The main channel is the main artery of the district, and I say that the duty of the District Boards is to keep the main channel and the tributaries in the same state that they got them up in if they have been approved by the Board of Works and the final award made. I say that is a difficult duty to perform, for the main channels are constantly filling up, and it is a very difficult thing to keep the main channel, with a number of tributaries pouring their waters into it and bringing down silt, from filling up, and therefore I think it would be a very desirable thing in the maintenance that always an unwatering cut should be provided for.

3314. Mr. Abernethy.—What do you mean by the unwatering cut?—I mean, in making the main channel there is, generally speaking, an unwatering cut to be used, much less than the size of the main channel, into which the water is diverted from the main channel.

3315. A relief channel for the floods?—No, it is not that—it is to divert the water from the main channel while one is cleaning the main channel, because it is a very difficult thing with shovels and drags to clean up a river of any considerable depth, and in these districts we have often spoiled, especially in this larger one of the Branna, of requiring the use of a dredging machine for taking up the silt, but it is an expensive thing of which the funds don't admit.

3316. Mr. Garvey.—You mean that where the unwatering cut is made for the purpose of carrying out the works it should be maintained afterwards?—Precisely.

3317. For use from time to time whenever you wanted to clean out the main channel?—Precisely—it could be done in joints, and once in every three years the waters could be diverted and the main channel cleared. I see very plainly that although the Drainage Boards are supposed to keep the works in the same order that they found them in, they do not, and they cannot. The bed of the river wants clearing up, and it is almost impossible that labourers with shovels could take out all the stuff that comes into it.

3318. Mr. Abernethy.—When the water is diverted into these relief channels which you speak of and you proceed to deepen the main channel, you have to construct dams across the main channel in the meantime to shut the water out of the main channel?—Certainly, and that could be done in joints.

3319. But if a flood comes down the river during the time that operation is going on, what happens?—



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The works are always supposed to be done in the summer, and we seldom have floods then.

3320. You have summer floods?—There are summer floods, but in most of those rivers, they don't come down so very rapidly. In some of the mountain streams of course they do, but even if they do come down and make a burst there is no great harm done—you have only to wait a bit and turn it out again.

3321. What length of relief channel would you propose to form?—I would carry the relief channel all along parallel with the main channel, all the way as far as the district extends.

3322. Mr. Barry.—I presume then that the cut would be a cut large enough to take the summer flow of the river?—Yes, just.

3323. Mr. Pies.—In cases where there were mills, the mill-stream would serve the purpose in summer?—Yes; but that would be a very small portion.

3324. Mr. Almondy.—You have stated that the main channel was as deep as it could be made except where there are no mills?—Generally speaking, there are no mills. The Branna district is the largest I am acquainted with. It is what is called the larger Branna, which flows from the lake at Mullingar into the Shannon. It is in two districts—one from Mullingar down to Killybegga, and then down to Clara. There is a large mill—what is Messrs. Goodbody's flour mill—and a weir there.

3325. What fall is there over that weir generally?—I am not able to say. For some distance up from the mill—I suppose for two miles up—there is very little fall. It is very dead and overflows frequently, and it is impossible to carry out thorough drainage. That is what I was speaking of in reference to arable land—that the benefit to arable land from arterial drainage is very many times has not been as great as might be, or as ought to be, if the main channel was deep enough. Then as to the arable land, a great deal of it in these valleys and flat lands is of an inferior quality—moor—and there is very little good to be got out of it, unless you can thoroughly drain it and improve it.

3326. The Chairman.—The obstructions to the thorough drainage are these obstructions in the main channel?—Yes, the main channel not being sufficiently deep.

Mr. Almondy.—And that aggravated by the weirs?—And that greatly aggravated by the weirs.

3327. The mills require a constant level for their wheels?—They do, and I have often thought that it would be a very proper thing to have those weirs registered and watched, for there are such things as the raising of weirs very gradually.

3328. The Chairman.—Your remarks apply to the arable land; what about the pasture land?—The pasture land has derived more benefit from the arterial drainage than the arable land, but in that too I think there has been disappointment, for this reason,—the lands, after they have been drained and relieved from constant floods, have for the first few years greatly improved. The coarser grasses have died out, and they have been replaced mostly by a better quality—invariably by a better quality for the first few years—and then the occupiers are delighted with the improvement, and they think they have had good value, and then they go on moving away year after year, hardly ever applying any top dressing, and in a few years after the last eight or ten years it gradually begins to deteriorate; and at this present time, in most of the districts I am acquainted with, the pasture lands are of a very inferior quality, except where there is a deep alluvial soil that will bear that constant drain—exhaustion in fact.

3329. Mr. Barry.—Do you think on the whole the pasture would have been better if left undrained?—I really know some cases where it would. Of course the scouring of the coarser stuff was most uncertain. It was always coarse, but cattle would eat it if it happened to have been saved in fine weather; but the quantity was a great deal larger. I am not advocating

leaving things in the old state, but I am merely saying there has been disappointment in the results to the pasture lands, but that has arisen a great deal from the bad farming.

3330. The Chairman.—From want of manuring?—From want of manuring. When the manuring which has been given by the floods has been removed and been replaced by nothing, the finer grass will not stand that, for not only do they mow away every year along the calverts, but they eat down the after-grass, and then in the spring the roots are not protected; the first comes, and the finer sorts die out in a short time.

3331. The owner, who has hitherto borne all the expense of the drainage, has no contract with his tenants to compel them to farm properly?—No, not nowadays; that is a thing of the past.

3332. Before the Land Act of 1881?—Before the Land Act of 1881, I do not think there was any great pressure put beyond simply advising in the matter.

3333. They had no legal claim on the tenant to properly farm his land?—No; I do not think so. It was never the practice in those places to prohibit a tenant from taking two meadow crops in succession off these low lands. There was not the same restriction that was applied to arable land. No doubt after the districts have been drained for some time both landlords and tenants think the change is very high.

3334. In consequence of the neglect of both?—Well, the landlord has lately very little power in the matter.

3335. Not now, but had not he before the Land Act?—No power, I think, except to turn a man out, and that is not a popular thing.

3336. Mr. Almondy.—They think the change too high because, by overtopping, the land has deteriorated in value?—Yes.

3337. Mr. Barry.—We have had some evidence as to the advisability or non-advisability of excluding winter floods from the lands. Would your view, therefore, be that on the whole it is better to have winter floods on the lands rather than trust to the tenant dealing with the finer grasses to the best advantage?—Upon the whole, in the smaller districts I should say decidedly remove the winter floods; but in the larger districts, such as the Shannon and some of the larger rivers, I think it would be better to endure the winter floods and to leave them.

3338. Assume merely for the sake of argument that the winter floods are removed without any cost to the tenants or owners?—I have not very great experience on the Shannon except in one locality, but I think they would prefer the winter floods.

3339. What I wanted was your judgment upon it?—For my own part I would remove the floods. If I owned the lands myself and farmed them myself I would remove the floods, because I could graze them and top dress them and improve them in a way that rarely is done.

3340. But assuming you have to deal with the class of tenants you have to deal with in the Shannon Valley—under those circumstances what would be your opinion?—Under those circumstances, if it was left to themselves, and to be done for nothing for them, I dare say it would be better to remove the floods. I think it would under any circumstances.

3341. The Chairman.—I rather gather from your evidence that although a great deal of money has been spent in improving these lands, they are gradually returning to the same unprofitable condition in which they originally were?—Yes. Of course not the same, because it is a different condition of things; they are becoming unprofitable from exhaustion.

3342. Mr. Almondy.—The evidence we have had with reference to the effect of winter floods is that they furnish a top dressing—that is to say, the deposit left by the winter floods has been found very beneficial to the lands on the Shannon?—Yes, and that, I think, is the general opinion.

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3343. *The Chairman*.—That does not apply in all cases; the waters may not bring down fertile matters?—That is very true; and the way these lands are held along the banks of the Shannon, in small quantities, makes it perhaps desirable that people should not have these winter floods removed, because they cannot take advantage of it in the same way that an owner would if he had a large tract all along, and could graze it periodically and improve the herbage in that way; but with regard to these small tracts, where the callows run down perhaps with a breadth of four or five acres, I dare say upon the whole it is better for them to be as they are.

3344. Now as to the indirect advantages of this drainage, have you any remark to make on these three heads A, B, and C?—I think the effect on the climate has been decidedly beneficial.

3345. In what way?—Well, in the way of removing from these large flats stagnant water and fogs, and generally making the atmosphere lighter and better.

3346. Has it removed malaria by any great extent?—Well, I cannot say really, from any cases that have come under my notice, that malaria existed to any great extent.

3347. You cannot say that it has improved the health of the district?—I think it must have had that effect, decidedly. I think we should have more rheumatism.

3348. *Mr. Barry*.—Is ague at all rife?—No, not very, but rheumatism is very, and it appears to be greatly on the increase. It is a complaint that was not much known really twenty years ago amongst the peasants, and now there is hardly a house you go to that some of them do not suffer from rheumatism.

3349. The winter floods, I suppose, are the most extensive floods?—Yes, very much so.

3350. And they remain longer than other floods?—Yes, autumn floods are generally of very short duration.

3351. Then as regards climate, the winter floods are of very considerable importance?—I think so.

3352. *The Chairman*.—I think you have pretty well answered the second question, inasmuch as I suppose the increased rateable value went on for a certain number of years, and then gradually declined, until the rateable value must have returned to its original position?—I would not go quite so far as to say that it has returned to its original condition, because there is still the power of doing good. The great difficulty to be contended with has been removed to a great extent.

3353. Unless the tenants farm better it will return?—Unless they change their system of farming it will be so bad. They get as little of it in point of crop now as when it was under flood.

3354. *Mr. Pies*.—Is that condition of affairs universal, or are there here and there tenants who have treated the lands properly, and are doing well by it?—There are some, decidedly.

3355. *Mr. Barry*.—Drainage gives the possibility?—Precisely. I know one case in one of those districts I am speaking of, where there is a patch which the tenant has top dressed and fenced up, and preserved the fine grass, and treated it as it ought to be treated, and it is perfectly good and profitable, and well worth the money, and then on each side of it is this impoverished land.

3356. I suppose this unscientific mode of treating the land is not confined to land that has been drained, is it?—No, it is not, but you can, perhaps, make some allowance for people not taking it in all at once. If they get a good crop for a few seasons, and they go on, they gradually find, I suppose, when it goes on a little longer, that they must apply something to restore it.

3357. *The Chairman*.—They defer it to the last moment?—I suppose so. It is very hard to get any improvement effected. I was under the impression that the increase of rateable value meant whether the rateable value of the property for taxation purposes ought to be increased.

3358. *Mr. Barry*.—You took it to mean that?—Yes; that is what I took it to mean. What I thought was that the rateable value should certainly not be increased till the instalments were paid off.

3359. Then you think the rateable value should not be increased for thirty-five years?—I think not. I do not think it would be fair to make people pay for the improvements by contributing to the poor rates, and so on.

3360. *The Chairman*.—That would depend upon the amount of the improvement. Suppose, for instance, the land increased in value £1 per statute acre, and the tax before the improvement, we will say, was 5s. an acre. Surely if it improved to £1 an acre, the amount paid for the extinction of the loan and for the maintenance, would not amount to anything like that £1?—No.

3361. Then should not the remainder be added to taxation when you get a maximum improvement?—Taxation for contributing to the road rates and county cess—no, I don't think so.

3362. There is a provision in the Act of Parliament, is there not, that no increase in taxation shall take place for seven years?—I think there is, and in my experience I do not know any district where there has been any increase of taxation. I do not think it has ever been revalued and the taxation raised.

3363. Why was that provision inserted in the Act of Parliament?—I cannot tell, but certainly in the districts I am acquainted with, there has been no increase of rating on improved districts, and I hope there will not be.

3364. Have you found that the drainage has improved the roads and the intercommunication between district and district?—Not much in that way. Sometimes it has caused a bad bridge to be pulled down and a good one built, and the expense of that is shared by the county.

3365. Now, will you turn to question No. 3. Have you much work remaining to be carried out in the way of 'arterial' drainage?—Yes, although we have done more in our district than most counties in the way of arterial drainage, still there is a considerable amount remaining to be done.

3366. For which existing Boards are formed?—No, there are no Boards formed except those that are in operation.

3367. Does that amount to a very large area?—I cannot exactly say—it would amount, I should say, in the King's County, to sufficient to form as many districts as have been formed already, eight or ten more drainage districts.

3368. Under the existing Act of Parliament the landowners are not likely to apply for those Boards?—No.

3369. *Mr. Barry*.—What would be approximately the number of acres in King's County remaining to be drained?—I should say there are 40,000 acres still to be improved.

3370. *Mr. Pies*.—Do you think that they would pay to improve?—Well, that all depends upon the terms upon which we could get the money.

3371. Taking it on the same terms as you had it previously?—In some districts I think they would. Where there is no compensation to be paid for mills, or where there are no great impediments in the way of rocks, but there are many such. Two of these districts that I have alluded to are districts that have been done without any great expense, and without having to compensate millers, or without any great amount of rock cutting, and there are many such remaining in the King's County that could be carried out with advantage.

3372. *Mr. Barry*.—What would be the approximate capital cost per acre which would be warranted by the improvement to be gained upon the 40,000 acres you speak of?—I should hardly like to say that, the quality of the land is so very variable.

3373. *The Chairman*.—We shall get at that if we ascertain what would be the cost of improving in per acre, and what would be the increased value of the land per acre?—I can hardly say.

3374. Mr. Pies.—Perhaps you can tell us about what the cost per acre is in two or three of those cases which have been done under the Act of 1863?—I could tell you that. I will take Derrinough; the sum expended there was £2,065, and the area improved was 622 statute acres.

3375. Mr. Barry.—That is about £3 10s. per acre?—Yes, that was a good district, and that was a moderate sum.

3376. Was that under the 1863 Act?—Yes.

3377. The Chairman.—The cost per acre was £5 4s. 6d., that is a moderate amount, and the land was improved to what extent in annual value?—£143 15s. 4d., and that works out at 4s. 7d. an acre. I think that is quite enough, I think, for the average class of lands we have in the King's County; anything over 4s. an acre is quite enough. We have no single district where it is uniformly good land, or uniformly alluvial deposit, but it all goes back into more and muddier class of land. In the Broom Park district the area improved was 11,958 acres; the total expenditure, £107,657; cost per acre, £8 18s. 4d.; annual value of improvement, £2,871, or 4s. 9d. per acre. In the Castlebernard district the area improved was 2,489 acres; the total expenditure, £22,308; cost per acre, £8 17s. 8d.; annual value of improvement, £709 1s. 3d., or 5s. 8d. per acre. In the Kiltlaggan district the area improved was 5,458; the total expenditure, £39,859; cost per acre, £5 9s.; annual value of improvement, £975 8s. 9d., or 5s. 7d. per acre. Then, in the Derrinough district the area improved was 5,600 acres; the total cost, £6,708; cost per acre, £1 3s. 11d.; annual value of improvement, £368 1s. 4d., or 3s. 5d. per acre. Then, in the Ballinacraig district, area improved, 2,502 acres; total expenditure, £8,975; cost per acre, £2 7s. 5d.; annual value of improvement, £316 14s., or 4s. 1d. per acre. Then, Frankford river, area improved, 1,204 acres; total cost, £7,542; cost per acre, £5 10s. 8d.; annual value of improvement, £414 16s., or 4s. 10d. per acre. Then Fawcettstown district; area improved, 2,719 acres; total expenditure, £11,549; cost per acre, £4 4s. 6d.; annual value of improvement, £650 15s. 5d., or 4s. 9d. per acre. Then, Bodinnary; area improved, 926 acres; total expenditure, £8,107; cost per acre, £3 7s. 1d.; annual value of improvement, £197 13s. 8d., or 4s. 3d. per acre. Then, in the Silver River district; area improved, 1,692 acres; total cost, £5,871; cost per acre, £3 12s. 8d.; annual value of improvement, £315 10s. 9d., or 5s. 11d. per acre.

3378. We have been told by some witnesses that no amount of expenditure would improve some lands?—I do not agree with that.

3379. Or rather that no improvement could be expected from a trifling or even any amount of expenditure?—That does not accord with my experience.

3380. Mr. Abernethy.—But if it costs more than £4 an acre, the land would not bear it?—I do not think so.

3381. It would not be worth doing?—No.

3382. Mr. Pies.—You are speaking now of the general character of land in King's County?—Yes.

3383. Mr. Barry.—On the assumption that the land bears the whole burden?—Quite so.

3384. The Chairman.—I presume you would not advocate any expenditure which would not be repaid by the increased value of the land?—Certainly not.

3385. We have been told that it is desirable that the State should advance money to reclaim the land, although there would be no profit attached to it?—For the good of the climate, perhaps.

3386. Perhaps for the good of the people who are employed?—I think that is an unsound principle. Plenty of profitable work can be had without that.

3387. I presume you agree with most of the witnesses, that landowners do not avail themselves of the powers of the Act of 1863, since the passing of the Act of 1881?—No. Two districts that were in the course

of formation when that Act passed were suspended and dropped, and no district that I am aware of has been got into operation since the passing of the Act of 1881.

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3388. Then it is clear that there is some attention required in the law, if those drainage districts are to be improved?—Yes.

3389. What changes would you suggest about that?—I think the Act of 1863 is an excellent basis. It was a great boon and was largely availed of when it came out, and I think it would be an excellent basis for another Act; but, of course, the occupiers, I think, should be the persons, if they come within the operation of the Land Act, that should directly be charged with the expenditure, and I think they should form the drainage boards.

3390. In forming the drainage board from the occupiers you would not exclude the owners if they were popularly elected, a popular election being assumed to be the mode of election?—Certainly not.

3391. So that, although the owners may not be occupiers also, you would not object to their being elected by the occupiers if they thought fit?—Certainly not.

3392. Would you attach any qualification to membership?—Yes; I would.

3393. What amount of qualification?—I think a rateable value rated according to the poor-rate of £30 a year. Of course there may be cases in a district where the owner will also be the occupier.

3394. Assuming that the owner was not an occupier, you would not exclude him from the board?—I would not exclude him. I think it is very likely some of the occupiers would like to have an owner, perhaps from his experience.

3395. Extending that a little further, as you said in the former part of your evidence, you would extend the drainage boards and not confine them to little districts; you would let them have control over the entire district to be benefited?—I do not know that there would be any very great advantage in making a drainage board and giving it charge of too large a district.

3396. Are they not now in most cases too small?—I have not found them so.

3397. Is it not the fact that in some cases you carry out a drainage scheme and then you find money, not exactly wasted, but not utilized to the full extent in consequence of want of improvement lower down the stream?—Well, in consequence of obstructions lower down the stream the whole benefit that might be derived certainly is not.

3398. And will not the converse also apply that in consequence of the drainage of the upper part of the catchment basin the lower part may be damaged?—Decidedly.

3399. Is it not desirable, in consequence of that, that the whole should be under one drainage board?—It would be, perhaps. I am not in favour of too large districts, because I think it very much destroys local interest.

3400. The way I put it to you is, is it desirable?—Yes, precisely; but I think that the Board of Works, under whose control I presume and hope that all these districts would still remain, ought not, in their superior knowledge of these things, to sanction any district where that would be likely to arise.

3401. Have they exercised that knowledge or that power?—In one case—a very remarkable one—that I am connected with, of the Frankford river; we took up a reach of the river and formed a district, and the lower reach had been already done; in fact it was a part of the Broom Park district, a good large tributary draining into the large main channel of the Broom. We formed a district called the Frankford District and carried out our work, and when we had done, the first winter after, the floods came down very rapidly, and the channel of the lower districts, which had been already drained, and was under maintenance,

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was not sufficient to take away the floods, and the people below in that other district were considerably damaged. I do not think that ought to have happened with clever men.

3403. Had the Board of Works power in that case?—The Board of Works had no power, but we got a special short Act for the purpose. We went down there into the other districts and we widened the channel, but the upper district had to bear all the expense of it. The lower people were damaged and were receiving no benefit from us, and it was not fair to put it on them. That made our upper district very expensive. That was after it was all completed, and in fact that district was taken up three times.

3403. For the general good is it not desirable that the whole district should be taxed for the improvement of the lands whether in the upper or the lower?—I think it is.

3404. Let me put a case to you as regards the Board of Works. If a board is petitioned for in an upper district they have no power to refuse that on account of it not including the lower district, which in their judgment, might be required to make thoroughly effective the drainage in the upper district?—Yes.

3405. They have no power to refuse that board for the upper district, although they may have that knowledge?—I know of a case in point where the board seemed to be sanctioning the formation of a district and we in the lower district objected, and so strongly that the Board of Works would not pass it, or would not sanction it, and it was withdrawn.

3406. They can decline to sanction it, but they have no power to include the whole district?—I am not aware. I cannot speak of their powers as regards that, but I know in the one district I speak of we had to get a special short Act to do that.

3407. But assuming that to be so, as I have put it to you, would it not be desirable that the board should be extended so as to embrace the whole?—It would.

3408. Mr. Fawcett.—Can you tell us why in the lower district of the large Bruma, close on to the Shannon, the drainage was not carried out there?—The large Bruma is carried out to Belmont Mills, and from that to the Shannon is a very short distance and a rapid fall. It does not require it. Your observation applies to the Little Bruma, which is a very important one from Parnassstown down to Mellick. That has not been drained, and there is a vast quantity of good land in that district that is seriously injured, but the expense of a mill stops the way, and the proprietors are afraid to face it. That mill, I am sorry to say—a very fine concern, and had been giving great employment—has been shut up within the last few months, as nearly all our fine mills are being shut up.

3409. The Chairman.—Why?—Because we cannot compete against the manufactured article coming from America.

3410. In the shape of flour?—Flour.

3411. They are all corn mills, I suppose?—Yes.

3412. Mr. Fawcett.—Is it as a land agent that you are interested in this neighbourhood, or as a landowner?—I am both.

3413. The Chairman.—Now, I think your answers have exhausted the questions up to question nine, except the extent of the area to be taxed. Are you in favour of confining the taxation to the lands improved, or would you extend it to the whole catchment basin?—I would only extend it to the lands improved.

3414. On what grounds would you exclude the other. Assume that the uplands, not, of course, subject to floods, have been thorough-drained, does not that throw the water more rapidly on to the low lands?—In a very small degree.

3415. Is it not the case sometimes?—As a rule I think the whole of the lands that have been really improved by drainage have been charged?—The area has been partly wide, although certainly some other land beyond that limit may be benefited.

3416. Is there not a great deal of arterial drainage

that does not at all apply to the uplands, unless these uplands are thorough drained into the arterial drainage. Is it not fair that the lands so improved should bear a portion of the charge of the arterial drainage?—I do not think the benefit to those other lands is, as a rule, very great.

3417. Does it not sometimes occur that you cannot drain the uplands at all, until the arterial drainage is carried out?—It does sometimes occur, but if that is anywhere within the radius of the main channel, or of the artery, the lands are charged. There are lands sometimes charged. I have known where there is a very great rise, and those lands are dry, and the lands are charged, even at the other side, simply because an outfall is afforded.

3418. We have had evidence to the effect that likewise the lands benefited alone had been charged with taxation, and yet the case I have supposed must frequently occur, and it is not that until the arterial drainage is carried out the uplands cannot be thorough drained; and yet, in one sense, the land is not damaged for the want of arterial drainage?—As a matter of fact, and as a rule, I think the uplands generally rise rapidly from the edge of the lands charged, and really do not derive a sufficient amount of benefit to make them liable.

3419. Supposing they thorough-drained their own land, and no arterial drainage is carried out, their thorough drainage does not improve the property so much as if the arterial drainage had been carried out?—Perhaps not.

3420. Is it not fair that they should be charged with a certain portion?—I think anyone that gets a proper outfall for thorough drainage ought to pay for it.

3421. Mr. Abernethy.—On the general ground, as you put it, of the improvement of the climate, which necessarily involves sanitary improvement also. Does not that justify, in a remote degree, some small contribution?—I do not know.

3422. You think that is too theoretical?—I think so.

3423. Is not the general effect of thorough drainage in the uplands to bring down the water much more rapidly during floods than when undrained?—Yes.

3424. Consequently it causes greater floods, of longer duration on the low lands?—Thorough drainage causes very little increase in floods.

3425. Do not you think, under those conditions, the uplands should contribute in some proportion towards the taxation of the drainage area?—Perhaps, but in a very small degree.

3426. Mr. Barry.—Do you know the Barrow River?—Very slightly, I have only had to do with one tributary of the Barrow. It was the subject of investigation before a Commission a short time ago, and I gave evidence at Pithavstown with regard to it.

3427. You may take it, perhaps, that the scheme for the Barrow works out to something like a capital charge of £10 an acre, as at present designed by the Board of Works. If nothing more than 4s. per annum per acre could ever be levied for such an improvement would you say that the River Barrow should be left in its present condition?—Yes, I should.

3428. You would prefer it to putting a heavy tax on the adjoining country?—Yes. There would be no use in breaking people. They would be simply broken if they had to pay a further charge on the Barrow to carry that out efficiently, according to the estimate of the Board of Works.

3429. And no means has occurred to you of asking other people in to bear a portion of the burden?—I do not think so. It is a very wide district, and a very large district, but still it is a very expensive district to do, and this tributary that I am connected with is a tributary in the King's County, and it runs through land that really would not be worth 4s. an acre, or anything like it, if brought in and drained.

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3430. My suggestion was not that more money should be put on the land than the land could bear; but are there any other sources from which contributions could be got to carry out such an improvement?—I know of none.

3431. Do you think Portarlough would not be improved if the floods were removed?—That is one of those questions as to whether there are areas which towns should contribute to the expense of the drainage. I think there are cases, certainly, and Portarlough is one. I lived on the edge of the Barrow myself, as a schoolboy, and I know what it is.

3432. Do you know Mountmellick?—I know a little of it—not very well.

3433. And Monasterevan?—Yes. And Ballinacree is another town that suffers greatly and is injuriously affected. I think all those towns should contribute decidedly.

3434. Does it occur to you that the whole basin of the Barrow is in some manner affected by this large excess of water remaining for months on the ground?—I was not aware of how far it was proposed, and to what extent it was proposed, to charge the lands for the improvement of the Barrow, and therefore I cannot speak of the area of the basin.

3435. The valuation of the improvement was about £10,000 a year, and the cost of the improvement was something like half a million of money?—Yes.

3436. The Chairman.—Would you consider it an unusual thing to advance capital to the extent of half a million for the sake of £10,000 a year increased value?—I should.

3437. Whether that money was contributed by the district or given by the State?—If given by the State it would be another thing.

3438. Still it would be money thrown away, would it not?—I do not know that it would be money thrown away. It would be of great service to the State. It would help to make people healthy, and rear good soldiers for England.

3439. Have you any remark to make on any subsequent question on the paper? Perhaps you will take them as you think you can give information upon them?—In some of those districts the charge has been for twenty-two years 6½ per cent., but in other districts 5 per cent. for thirty-five years. I would suggest that 6½ per cent. is too much, and that all districts ought to have the benefit of the longer time at the lower rate of interest.

3440. Upon that question we have had considerable evidence suggesting a longer period than the thirty-five years?—I was going to say that in cases where districts have to compensate small-owners, and where the works are really heavy, I think it would be only right to reduce still further the rate of interest and extend the period.

3441. Up to what extent?—I think if we take it at the same rate as the Land Purchase Act—4 per cent., for forty-nine years—that would be fair.

3442. You think it should not extend beyond that?—Well, I think that would be a liberal concession.

3443. One witness advocated, I think, sixty years?—Well, I think that people ought to be satisfied with what is reasonable, and we have got the Government willing to do that in one direction, and I think they should do it in another. One question asked is if the drainage charges were imposed on the occupiers of land how should they be recovered. I should say in the same way as the loans under the Land Act are recovered.

3444. Or as the county cess is recovered?—Or as the county cess is recovered.

3445. There are two different ways. Which do you prefer?—I say the same as loans under the Land Act are recovered.

3446. That is the repayment of the loan? How would you collect the maintenance charges from the occupiers? It is easy to collect them from the owners now, but when the payment is transferred from the owner to the occupier how would you suggest the

maintenance charges should be collected?—The maintenance charges I do not think there would be any difficulty about. It is a small thing when it is spread over a district.

3447. Still the money has to be collected?—I would make the land liable for it. Their interest in the land would be liable for it.

3448. As a simple machinery for collecting the money what would you suggest? Would there be any difficulty in putting that additional duty on the collectors of the county cess?—I do not think so. They would have to be paid for it. Of course that is a machinery in existence, and it would be a simple way of collecting it.

3449. Mr. Parn.—Would not a percentage on the sum collected be a mode of paying the collector—that could not amount to a large thing?—No; it would not be a very large thing. My own opinion is that the occupiers would do just as the owners do now, and if the rate were struck and notice served upon them that the amount was to be paid into the bank of the locality in a certain time, I think it would be paid. I do not think there would be any difficulty about that. I do not think there would be a "no tax" cry when the occupiers constitute the Board.

3450. And when they benefit themselves by it?—And when levying the tax themselves.

3451. Have you any remark to make on the suggestion contained in question 9?—If the occupiers are to constitute the new Boards, I should suggest that a Government Inspector should mark out districts and suggest them to the occupiers. I think that if the matter is to be taken out of the hands of the owners, the occupiers will hardly be in a position, without help and without instruction to take the initiative; but there must be some machinery to put the Board of Works in motion or the Government in action.

3452. Would a memorial from the district, whether from the owners or occupiers do?—That is the usual course.

3453. Then you must have a memorial from a certain number of occupiers?—I would suggest that it should be the duty of the Government, through the Board of Works, to take the initiative to inspect districts and to suggest districts.

3454. Would you suggest a roving commission through the country to suggest that this district, or that district, or twenty districts, should be undertaken; or would you not leave it to some one, even if it were a single individual, to take the initiative?—If a memorial were sent to the Board of Works, then they could send down an engineer—a duly qualified person—to survey the district and report what was best to be done.

3455. Would that be a simple mode?—If there was no objection to the Board of Works taking the initiative in the matter in the way of expense, I think it would greatly help matters.

3456. Do not you think it would fall into disuse altogether, do you think the Board of Works would take on themselves the trouble of sending a roving commission through the country?—That is a question; they might not do that.

3457. The machinery might be better put in motion by some one in the district who feels the necessity for improvement?—Yes. The occupiers will be so very incompetent in my opinion, to tell what ought to be the boundaries of a district, or how many of them should come together to suggest a proper district.

3458. I was asking you whether it should not be incumbent on the Government or Board of Works to send down to have a district inspected if they received a memorial even from a single landowner, or a single occupier of sufficient importance and influence?—Yes, that would be the initiative. That would be desirable.

3459. Then the next question is the preliminary expenses of that. At present you have to deposit a

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certain sum, you cannot get that money from the landowners in the future!—You cannot.

3441. The occupiers will be very chary of depositing money!—Yes.

3462. How would you suggest that the preliminary expenses should be defrayed?—I suggest, in the first instance, that the preliminary expenses should be borne by the Government. I presume that if the Government were set in motion about it, or the Board of Works, they would ask for some guarantee for the preliminary expenses.

3463. From whom?—From whoever memorialized.

3464. That is coming back to the present system!—Except that under the present system we have to find the "R.M.D.," and send it to the Board of Works. We have to collect it in the first instance.

3465. To deposit the money!—Yes, and it is allowed back afterwards.

3466. Would not there be the same difficulty if a man memorialized the Government, and he knew that sooner or later he should be called on to pay the preliminary expenses; do not you think that would deter him?—Yes, I thought of that difficulty before, and that was one of the reasons why I thought the Government ought, after a careful consideration—and I knew they have had reports from all the county surveyors and so forth, of the different districts that ought to be drained—and after thinking over what should be the best districts, to take the initiative and prepare these plans free of expense. Then there is the case of the district falling through.

3467. In case the scheme fell through, the Government should contribute that as a State contribution to the improvement of the district!—Yes, that is what occurred to me.

3468. Mr. Fin.—Then in case the scheme went forward you would charge those preliminary expenses against the scheme?—Yes.

3469. The Chairman.—Upon the land?—Yes.

3470. Have you any other observation to make on question 9?—No, I think I have nothing more to say upon that.

3471. Then question 10 we have exhausted I think, by your previous evidence, and the maintenance I think we have exhausted too!—Yes.

3472. Mr. Fin.—You said early in your evidence that maintenance, under existing conditions was very difficult!—Yes.

3473. I want to know what are the existing conditions?—The existing conditions are, that it is very difficult, where there is no unwatering cut, to keep the bed of the main channel as low as it was when the district was completed.

3474. It is a physical difficulty?—Yes, a physical difficulty.

3475. We have heard from some witnesses that when these works have been carried out the tenants adjoining the works sometimes injure them, and are very careless about them?—Yes, if they are not watched. In all the districts that I have to do with we have an engineer appointed at a salary which is part of the maintenance, and his duty is to inspect these works constantly, and see that no injury occurs. By having one engineer for several districts it makes up a reasonable salary, and in that way we are able to keep a good man.

3476. To facilitate the maintenance it would be an advantage to have the districts larger, so that you can afford to have a good officer?—There is no doubt it would.

3477. Have you means of imposing penalties on persons who injure works?—We have. I think the Act of Parliament provides for that.

3478. Is there any improvement required in those means?—Well, really, in any place where due attention and care has been paid to the works, no injury has arisen.

3479. Mr. Barry.—You think the cases of wilful injury are very small?—Very few and far between. There is not that wanton desire to injure a work of

that kind; besides which the occupying tenants save an interest in keeping the district in good order.

3480. The Chairman.—Do you wish to speak upon the last question with reference to navigation?—No, I do not think that comes within my experience. I am too much of an inland individual for that. But you have asked, "Should there be more Government supervision?" I think there should be more Government supervision when a district is finished, and even of our maintenance. We have no Government supervision at present. It is entirely in the hands of the local body, and I think it would be always advisable that there should be occasionally Government supervision.

3481. Assume that the districts are enlarged so as to employ some properly qualified engineer or surveyor—the same as the County Surveyor of Roads—he would not only be in communication with the Board, but also with the Board of Works, or some central board, who would have the drainage supervision of the whole country?—Precisely.

3482. And if he saw any inclination on the part of the Board to neglect the maintenance, he could report at once to the central board?—The engineer of the district is the officer of the board, and he would not be likely to report his own board. But, independent of that, I think there ought to be a Government inspection—say a triennial inspection. That would be often enough if there were a triennial inspection of each district to see that the people were doing their duty and not in any way neglecting it.

3483. Something like the Commissioners of Limerick, sending every year to inspect the County Limerick Asylum?—Precisely, and the Government Inspectors of Poor Law Boards.

3484. To see that the work is being properly carried out?—Yes, he comes into the board-rooms, and sits there now and again to see that the machinery is working all right. Then, there is one word I would say with respect to fish. I think the breeding of fish in our rivers is a very important matter, and it is not as much attended to as it should be. There are great facilities for destroying fish, and I think that in any legislation upon the subject of drainage the fish ought to be provided with proper places for getting up the rivers, and these should be carefully preserved. I also think it would be quite reasonable that drainage boards should contribute something towards the expense of the water bailiffs who are employed to look after the fish. The drainage opens the river for the destruction of the fish, and they are much more easily destroyed in a drainage district than they are in an undrained district. There are much greater facilities for poaching and killing there in every way, and I think some care ought to be taken of them. I think it would be reasonable that the drainage boards should contribute something towards the expense of that.

3485. I am afraid that question is outside our inquiry, but your evidence will appear on the notes, and may have some effect.—I beg to be excused for having mentioned it.

3486. Mr. Barry.—Do you happen to know why nearly two-thirds of the sum for the drainage of the district of the Bann was remitted?—Yes; that was done under the Board of Works, and there was a great row about it in Parliament at the time. There was a Commission of Inquiry, and there were great charges of extravagance brought against the Board of Works at that time. I do not remember it, but I have often heard that the late Lord Rose, whose property I manage now, took a very active part in getting that remitted, and there was an Act passed—it went through the House of Lords—to knock off a very tremendous sum from the several districts in Ireland.

3487. The cost is put down as £107,032, and the amount charged is £39,540, and that is dated in 1860?—Yes, I think those works were carried out long before 1860.

3487. The remission was made in 1869.—Yes, it was in remission for a long time, but it was before 1869 it was agreed these sums should be remitted. It must have been about 1850 or 1851. There was a great row about the drainage generally that was undertaken in the country at that time. There were some very heavy works undertaken. There was also a large sum remitted in the Kilbeggan district of the same Barony, and I think in the Castlebar district and in some of the larger districts throughout the country.

3488. Was the ground of that remission that the Board of Works had executed the works extravagantly, or was the ground that they were relief works?—I think it was both. I think there were both those elements. I am far from saying that they were altogether established against the Board of Works. They are a body I have a great respect for, and I think they are very efficient now, whatever they were then. But there were the charges that were brought; and the opportunity of the bad times and the famine year, and all that, was taken to call them relief works to a certain extent.

3489. The Chairman.—In your judgment, knowing that the drainage works of the Barrow district would cost £500,000, and that the improvements would only

yield £10,000 a year, do you see any possibility of that scheme being carried out short of a free grant of a very large amount from the Board of Works?—None whatever.

3490. Mr. Abernethy.—Was not one reason that these great remissions were made that the increased value of the land did not at all compensate for the expenditure?—Yes.

3491. Mr. Pies.—Is there anything in the method by which compensation is given to people who have claims under those drainage works that increases the cost of compensation beyond what it ought reasonably to be?—In regard to mills and water power, and the abolition of water power, I do not know that there is. The Act provides, I think, a fair machinery for doing it with evidence on both sides and a Government Arbitrator; but, generally speaking, the amount that is awarded to millers for the loss of their water power has been really more than a district could bear to make it pay. I do not know that the machinery is wrong, but the practical result has been that the district really has not been able to bear profitably the large sum that has had to be paid to millers.

The witness withdrew.

Adjourned for a short time.

Mr. Edward Murphy called in and examined.

3492. The Chairman.—I believe you wish to give some information as regards the terms of arbitration and compensation?—I do.

3493. Where do you reside?—I reside in Dunfargally, County Donegal, and also in Belfast.

3494. Are you a land agent?—Yes; I manage four properties in the County Donegal, three in the County Down, and one in the County Antrim.

3495. Then I will not trouble you by going through this list of questions, but if you have written out a statement upon the points you wish to speak to perhaps you will favour us with it?—The only connection I have had with arterial drainage was a futile effort to get up two drainage districts in the County Donegal.

3496. When?—About eight years ago. We went through all the preliminaries, and we got the sanction of the Board of Works, but when it came to a question of who was to pay the tenants would not. Then the landlords thought it was not necessary to get in collision with the tenants, and the thing fell through. They were two important districts, the Upper Finn and the Lannan Rivers, where there is enormous damage done, and the tenants at the present moment are deriving from us an abatement of rent owing to damage done by the river, which I offered to improve for them.

3497. Will you explain more fully the nature of the drainage works you required, and the amount of land that would be improved?—The only thing I can tell you from memory is that the cost would have been about 6s. per statute acre.

3498. Per annum?—Yes; that would be the drainage tax distributed over thirty-five years.

3499. What would be the annual improvement?—It would have been very much in excess of that. Their own evidence was that they lost a crop every three years, and the average crop of that land would be £5 an acre. I mention this fact to show the difficulties that are in store for drainage districts in future.

3500. Eight years ago the whole obligation fell upon the owners?—Quite so; but in those cases I refer to the owners thought it prudent to consult the tenants and to tell them what amount of taxation would be put upon them. They did not intend to charge them anything for their own share of the unearned increment at all, but they let them know

what the tax would be, and they were hooted out of court.

3501. What quantity of land would have been improved?—There would have been, I should say, 500 statute acres in each district. They were small drainage districts.

3502. What would have been the gross cost?—I expected to be here on the 18th, and then I should have had all my papers with me, but I am not prepared with those figures. I will supplement the exact figures. My only other connection with drainage districts has been as arbitrator under the Board of Works in assessing the compensation for land taken for the actual works and for damage to property adjoining—mill properties and fisheries and oil works of all descriptions.

3503. Will you take those separately. First of all you have had experience in the valuation of mills?—Yes; there is very great difficulty, owing to there being no definite law laid down for the arbitrator in assessing the compensation. He has simply to arrive as best he can, at the value and the consequent damage, from the evidence brought before him. Then having arrived at his opinion and given his award, that is subject to a traverse, and that traverse is before the Judge of Assize and before a jury; and, the consequence is, that the districts are often ruled in the most extravagant sums, which are almost prohibitory.

3504. And that deterr owners and occupiers from undertaking drainage works for fear of these heavy compensations?—Quite so. There is one case I may mention which was not the case of a Drainage Board; but under the Railway Act—the Act of 1851. I awarded a man I think about £265, and the jury awarded him £265 for a little bit of severance, and for losing less than an acre and a-half of land, a most extravagant sum. There is no control over that under the present Act, and I think it is utterly wrong that the traverse should be from an expert, or from a man who ought to be an expert, to an untrained jury who do not see the premises, but merely hear the evidence, and are generally prejudiced very strongly against compensation.

3505. Mr. Barry.—What Act is that you refer to?—The Railway of Ireland Act, 1851—the 14th and 15th Victoria, cap. 70.

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3506. Is that the equivalent of the Lands Clauses and the Railways Clauses Act in England?—Yes, it is, except that in Ireland there is only one arbitrator.

3507. The *Chairman*.—Would you say that no appeal should be allowed?—No.

3508. But would you suggest that instead of an appeal to a jury it should be an appeal to the judge?—To the judge, with power to examine the arbitrator in Court—anything to take it out of the hands of the jury. It is utterly prohibitory to all that class of work.

3509. Mr. Barry.—I think I am right in saying there is no appeal from an arbitrator in England?—No, and there ought not to be on questions of value.

3510. Nor from the jury. In England the compensation may be assessed by a jury or by an arbitrator?—Quite so.

3511. But in each case there is no appeal?—No; I sit as arbitrator, and then lodge a draft award. Then I publish a notice of the draft award, and lodge it in different places prescribed by the Act, and then I sit again to hear objections to that. Then I make a final award, and to that final award the traverse lies.

3512. The *Chairman*.—Would you assimilate the law of Ireland to that of England, or would you confine the appeal to a judge?—I think so, to a judge. Anything, as I say, to get it out of the hands of the common jury.

3513. What would be your objection in giving an appeal at all?—That is rather a delicate question for me to answer. I do not think there ought to be an appeal on questions of value. I think a man who spends five or six weeks in estimating and doing his best to arrive at an independent judgment, is far more likely to come at a correct judgment than any jury; but there are few points that an arbitrator might have difficulty in deciding, and there should be an appeal on those points to a judge. There are many difficult points arise before me which sometimes involve legal questions.

3514. Mr. Barry.—In England the claimant has a right to claim a jury?—I would not give him that right in Ireland.

3515. Mr. *McDonnell*.—Often in England, where the case is referred to a jury, the judge takes it from the jury and appoints an arbitrator himself?—Quite so, and then that is final.

3516. Mr. Pitt.—You say you are bound to go before a common jury. Have not you the power of asking for a special jury?—Yes, but if you know special juries in many parts of Ireland as well as I do, you would not think there was much in that distinction.

3517. But you have that power?—Yes.

3518. And you think the common jury does quite as well?

3519. The *Chairman*.—Now, will you go to your next head, weirs and fisheries?—They are all, in fact, involved in the same. In the Lough Erne Drainage District, where I was arbitrator, I awarded very large sums to the fishery people, and the jury increased them by £4,000. I was listening to the evidence before the jury, and the evidence the claimant gave was that he never had as good a season in his life as that season, and, notwithstanding that evidence, the jury increased the award £4,000.

3520. How were those fishery rights created which are involved in any improvement of a river?—They were by patent, a great many of them. That right to the fishery at the Lough Erne is a patent right.

3521. A patent from the Crown?—Then on the Stock drainage, where I was arbitrator, there were a lot ofeel weirs, which were not legal structures at all. I had no difficulty in dealing with them because my compensation was nearly a kindness bestowed on the Company.

3522. These fisheries are created by the erection of the weirs and sluices?—Yes.

3523. And by their erection for those other purposes fishery rights have been created I suppose?—Yes; but they have been created from time immemorial, a great many of them without any patent at all. The Lough Erne fishery is a patent fishery. The Marquess of Ely and the late Mr. T. Conolly had the patent rights; and they sold them to the Ballyshannon Fishery Company.

3524. What were they sold for?—Some very large sum—£40,000 I think it was. I have nothing to do in my official capacity, with assessing the rateable tax on the improved districts—that is another department of the Board of Works—nor the valuation of the land before it is improved; but as a land agent, and one greatly interested in the country, I think the present system adopted is not a good one.

3525. Perhaps you will describe the system which is adopted in valuing the improvements?—Anybody connected with the first body who wish to form a district employs a valuator, and he goes over and estimates the present value of the land and the probable improvement. That is all scheduled and sent up to the Board of Works, with a memorial to form a district. They send down an inspector, who nearly always confines himself to estimating whether the amount of out put down for carrying out the plans is sufficient, and whether the works are sufficient. Then, after the works are completed, the Board of Works sends down their valuer to distribute the charge. I think myself that it would be much better if the Board of Works had from the very start undertaken the valuations, in order that the person who saw the land before the works were commenced, and the person who assessed the improvement after the works were constructed, should be one and the same person or the same body.

3526. To assess the benefit?—To assess the tax which is on the improved value.

3527. Have you had your attention directed to the question of the area of taxation?—Yes; I have long formed an opinion on that.

3528. What view have you taken of that?—The present rule in Ireland has been hitherto simply to assess the lands actually, I may say, submerged—that is subject to flood.

3529. Or subject to saturation?—Yes. In one instance I see one of the valuations in the Barrow district took a level five feet above that line, but I do not think it ought to be confined to that area at all. For instance, anybody who has lived in a valley district like that is aware of the coldness, the fog and all that, which materially interferes with the atmosphere of a district in a zone very much higher than five feet, and which I think ought fairly to bear a small portion of the taxation. I know, as a professional man, in making valuations for fair rents I very often take off 10 per cent. for the proximity of lands to a flooded district. I know in every district where reservoirs are about to be established, that is one of the great fears the tenants have, that the temperature will be lowered and that the frost will be increased; and that the fogs that will arise from those reservoirs will damage them considerably. There is no doubt about it.

3530. Is it your view that the whole catchment area should be taxed?—I should think so. There ought to be two or three moor; and the whole area should bear some small portion of the tax like the County Cess which supports the public roads some of which a great portion of the public never see.

3531. Take the case, which has been prominently brought before us, of the Barrow, which consists of an area of 407,000 acres, where there are some 45,000 acres to be improved. Do you think that, taking all the circumstances into consideration, the entire of that area—the 407,000 acres—should contribute to the expense?—I think so; but that is a peculiar district. The present poor rate of that district is 1s. in the pound, and that is a very large assessment. Therefore it would be a very small assessment that the people would be able to bear.



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3532. Four shillings in the pound is a very heavy assessment?—Yes. The average of Ireland would not probably be more than 1s. 6d.

3533. Can you tell me why so large a district is subject to 4s. 1?—I do not know sufficient about it. I could ascertain it; but I suspect they are giving outdoor relief there. I suspect the boards there are not constituted as they used to be; and as the landlord has to pay a considerable share of the poor rates, they are not so chary about bestowing relief.

3534. Whatever may be the poor rate ought not to interfere with a just principle being laid down?—No; but at the same time you have to consider how you are going to work it. The rate collector would have a very warm reception I suspect in those districts if he came to demand 4d. in the pound or anything like a large sum.

3535. Mr. Pies.—In that rate of 4s. the average rate over the whole district or a particular rate in some parts?—I expect that is a particular rate in some parts of it. I was talking with Sir John Hall Greene the other day, and he mentioned to me that the rate was 4s. in the pound.

3536. Do you think the poverty in the district is at all the consequence of the constant floods?—There is no doubt about it; and in my opinion the valuations made of the improved value are utterly erroneous, and do not represent at all the value of the improvement.

3537. Either to the individual increase of land or to the district?—Yes. I think, if I remember right, the valuator of that district only estimates an improved value of 4s. to 5s. an acre.

3538. You stated that the unimproved land is valued by one valuator, and when it is improved by another?—Yes.

3539. Then I do not see how the latter is able to judge of the value of the improved land?—That is my opinion. I think it is absurd. I think if the Board of Works are to have any control at all they ought to have control over the valuations. I think it is an absurd arrangement; and the idea of assessing the improved value over a district like that at 4s. an acre is ridiculous.

3540. The Chairman.—If the district is to be drained how would you raise the funds?—In a big district like that I really think the Government ought to do something towards the main outlets. They ought to supply them in some measure at the main drainage of the country, leaving the tributaries to be borne by the district. It is no Imperial question, involving the health of the district and the employment of the people; and that is of such vast importance that I think the Government ought to provide, or do something towards providing, the main outlets. I believe they will be short in the Barrow district, even at the present estimate, by about £248,000, and that the present estimate of improved value would not stand the total amount required. The total amount required is £550,000 I understand.

3541. Roughly £500,000?—Yes, and there would be a deficiency. The valuator's estimate of the improved value would show a deficiency of at least £248,000.

3542. It would leave about half?—It would, and I believe that that estimate of 4s. on lands which are so frequently submerged is a perfectly fallacious estimate.

3543. It has been given in evidence before us that although in some districts—the Shannon, for instance—the winter floods bring down a great deal of fertile matter, which improves the land, there is nothing in the Barrow district of that kind, and the water is utterly useless for fertilising?—The land is simply waterlogged.

3544. Not only waterlogged, but there is no fertilising matter in it?—No.

3545. Consequently they necessarily put a lower value on it?—But when the water is got rid of the land will be worth infinitely more than 4s. an acre, removal of water then it is now in its waterlogged condition.

3546. On what ground do you base that opinion that the land would be increased to a greater extent than 4s. an acre?—On my knowledge of the difference between drained and undrained land—between waterlogged land relieved of flood and in its original state. At present it is utterly unproductive, but it would be worth 14s., 15s., or £1 an acre. It is better worth £1 when the water is off than 2s. 6d. as it now is.

3547. If your estimate of the increased value is at all correct there ought to be no difficulty in even spending the £500,000?—I believe myself that the estimate is entirely too low.

3548. Mr. Barry.—Do you know whether it has been estimated by anybody except Mr. Fitzgerald?—No. He is a very able valuator, none more so; but I think the view he takes of it is simply that of a landlord, and that he is going to charge a tenant rent for it. You must recollect that, that the land takes less labour to cultivate it, less seed, and will produce larger and earlier crops without any additional charge on the tenant except the drainage tax. In fact the improved value goes into the tenant's pocket *adversus* the tax.

3549. The Chairman.—What is the reason under the tariff?—I do not know the Barrow district much. It is clay and gravel and a kind of whitish clay. There is a good deal of gravel in the upper district, but the rest is mossy with a sward of dry.

3550. Assuming that the estimate of the increased value is correct, would you, on a question of national benefit or a question of political economy, recommend so large a sum to be spent as £500,000, when the advantage to be obtained are only £10,000 a year?—Yes, in this way. I do not think the advantages ought to be confined at all to the waterlogged or submerged districts.

3551. Would you extend the area of taxation over the entire 400,000 acres?—I would to a small extent in some, decreasing the taxation as I went along.

3552. The zones would be first the lands absolutely injured by the floods?—Quite so.

3553. The second zone would be the land subject to fogs and so on, and the third zone would be the higher grounds?—Quite so.

3554. If it is upon the assessment value the mountain land, if only assessed at 1s. a year, would only pay its proportion?—Quite so, and there is no doubt that mountain land constitutes a good deal to the flooding of the lowland. I know this myself, that I sheep-drained some thousand acres one season, and nearly swept away all the gulleys and bridges of the lower district the next winter.

3555. On the lowlands?—Yes; it sent down the water in such a rush off the mountains at Deneag, and swept away a whole lot of gulleys and pipes.

3556. Mr. Barry.—How would you limit the second zone?—To what I call the temperature zone subject to fog and the actual effects of evaporation; in fact, it reduces the temperature by one or two degrees. I should say it would be two degrees, and that is a very serious thing in our short summer.

3557. You could not tell us whether that should be a mile or a half-mile?—It depends on the altitude.

3558. What altitude would you say?—I should say a hundred feet above the submerged district the land is affected.

3559. That would make a material difference in the annual assessment?—Of course it would.

3560. Mr. Pies. Would it be a poundage rate on the valuation you propose to put on the mobile zone?—I think so.

3561. The Chairman.—You would put a higher poundage rate on the flooded lands?—Yes.

3562. A little lower upon the climatic zone, and a lower rate still upon the upper lands?—Quite so.

3563. Mr. Barry.—Could you give us any notion of how you would divide the charge between the second and third zones?—If you divide the whole charge into 20ths, I should say  $\frac{11}{20}$ ths ought to be borne

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by the submerged lands;  $\frac{1}{3}$ ths by the climatic zone, and  $\frac{1}{6}$ th by the general district, or something of that sort. I remember working those proportions out myself long ago. I cannot exactly give you the details, but those are the figures I had arrived at as what would be fair.

3564. The Chairman.—If you take that calculation and apply it to the Barrow district, we will say it costs £500,000, and the loan is at 4 per cent, that is £20,000 a year; then the lands subject to floods and injured would bear £14,000 a year?—Perhaps I have not explained it far enough. Those figures,  $\frac{1}{3}$ ths, would be only  $\frac{1}{3}$ ths of the improved value of the submerged district taking the Barrow district.

3565. Still you must make the calculation on the money to be spent?—Certainly.

3566. However, you put it,  $\frac{1}{3}$ ths would amount to £14,000 a year?—It would of the whole outlay.

3567. It would amount to £20,000 a year in the whole?—I do not contemplate that the district will find the £500,000.

3568. How do you propose that the remainder should be found—as a free gift by the Government?—In these larger districts it cannot be done otherwise. If for political or social purposes it is thought desirable to do it, as I think it is, the Government should make up the deficiency. The money cannot be found in the districts themselves.

3569. Mr. Pies.—Supposing the money in that very case to be charged on the submerged lands to be £10,000, do you think there would be about £3,000 a year that should be charged over the area?—Yes, that is precisely what I would strive at—that you would derive out of the district about £10,000 a year.

3570. Mr. Abernethy.—Do you include the callow lands in the  $\frac{1}{3}$ ths?—Well, callow lands are difficult to deal with. I am aware on the river Suck that the improvement will not be an improvement to those lands at all. Callow lands are wonderfully improved by the flood, and unless the drainage is sufficiently deep to enable you to change the character of those meadows and the character of the grasses that will grow on them, I do not see that it improves them at all; if you only reduce the drainage level to two feet you cannot grow the dry land grasses upon that, and that is too dry for the callow lands. There is a great deal of difficulty about what are called callow meadows, and I saw great difficulty myself on the Suck on that very question.

3571. Mr. Pies.—Have you been engaged in relation to the present Suck Drainage Works?—I have.

3572. Then you think if the grass lands remain saturated that you have not done much good?—I do not think you have.

3573. Saturated but not submerged?—I do not think you have. I think you get up a cover and a worse class of herbage than callow meadow herbage and it becomes semi-arid. All this is very empirical but I have given the subject a great deal of thought.

3574. Mr. Barry.—You think the three zones would be benefited in the proportions respectively of  $\frac{1}{3}$ ths,  $\frac{1}{3}$ ths, and  $\frac{1}{6}$ th?—I have arrived at that opinion. I think they are bound to supply some portion of the cost of the main artery of the district, and possibly that outside zone.

3575. And if that mode of calculation were not sufficient to provide the money?—Then the district must fall through, or the Government must come forward themselves or reduce the rate of interest. Their ordinary interest is 5 per cent, for thirty-five years. That is the lowest rate at present, but I do not see why if they lend it to tenants to buy lands at 4 per cent they should not do so in these cases and that would reduce the annual charge; or they might go further in the large districts and extend it for a greater number of years at a lower rate of interest—3½ per cent, for sixty years to pay off principal

and interest. There are not so many of them in Ireland, and they are really Imperial questions.

3576. The Chairman.—The Barrow seems to be the most important in Ireland?—I should say it is now.

3577. Mr. Barry.—And some such note as you suggest is the result of your general experience on the subject?—It is my general idea.

3578. Going back on your earlier evidence about the districts that were tried to be formed in Donegal, you said it would have cost 6s. per statute acre?—That would have been the drainage tax for the cost.

3579. Would that have fallen entirely on the tenants?—Yes. That was meant to have fallen entirely on the tenants because the landlords did not intend to derive any benefit, at any time, because they offered to give the tenants a lease for thirty-five years provided they paid the rate.

3580. That was refused?—Yes; and I have now in my bag a claim from these very tenants for abatement of rent this year, for destruction of their crops by the overflow of the Finn. It is beautiful land—a valley of alluvial land. The river is embanked, but the toe of the banks wears away. It is alluvial on a sandy bottom, but in places it is flooded to a depth of five or six feet.

3581. The Chairman.—Where is that?—The Finn Valley between Stranorlar and Stranorlar.

3582. Mr. Abernethy.—Are those banks on the margin of the river?—Yes.

3583. And they are worn away by the action of the current?—Yes, by the action of the current. It is a very tortuous river, and the flood rushes down with great rapidity. The banks are founded on sand, and for fourteen or fifteen feet down there is no solid foundation.

3584. And on the opposite bank of the river the current cuts into the bank?—Quite so, and it is swept away.

3585. Mr. Pies.—What height are those embankments?—Some are six, eight up to ten feet.

3586. Were they put there by the landowners or the drainage board?—I am agent for one portion of the estate and the landowners assisted largely in keeping them up themselves. Much damage is occasioned by an old mill weir standing there. It is a valuable mill standing at the end of the district, but probably the owner of that mill weir would claim thousands of pounds for the loss of his mill-power which he has not used for years, and if he were to go before a common jury he would very likely get it.

3587. The Chairman.—A common jury would give him compensation but an arbitrator judge would not?—Certainly not. He would estimate the value of the property to the men for a sufficient number of years—five, six, or seven years. I generally take a run of seven years myself, to ascertain what profit he has been making and assess it in that way.

3588. Mr. Barry.—Referring to your evidence about arbitration, how is the arbitrator appointed in Ireland?—The company or the promoters apply to the Board of Works, and the Board of Works under their hand and seal appoint the arbitrator in each case. The practice has been always to appoint the same person, but there is nothing to prevent the Board of Works appointing a different person every time. I get my appointment in each case.

3589. Mr. Pies.—The appointment is for the whole of the scheme?—Yes.

3590. Is not there a difference between what is called the notice to treat in Ireland and in England? In Ireland it is general over the whole scheme; in England it is separate in each individual case?—Quite so. In Ireland the promoters lodge a schedule a copy of which is to be at the Board of Works; a copy with the clerk of the union, and a copy with the clerk of the pence. These are open to inspection. In that they give the quantity of land they require and the price they propose to pay, and if you choose to accept that you do not go before an arbitrator at all. If you do not accept it you send a written claim to the arbitra-

508 who publishes his intention to hold an inquiry, he holds it accordingly, respects the lands, and makes his award.

509. Do you know how the arbitrator is appointed in England?—I think it is only under the Lands Clauses Act, and he is the first court.

510. Mr. Berry.—He is appointed in a different way in England. Each party nominates an arbitrator and then they choose an umpire—I thought there was another way.

511. The Chairman.—By consent you can leave it to one arbitrator, but the Lands Clauses Act provides for each party appointing one, and their appointing an umpire. If the claimant originally agrees to go to arbitration he has no appeal from the award.—No.

512. Mr. Pim.—In the first instance may he elect?—Yes, in the first instance in England.

513. Mr. Abernethy.—He elects to go before a jury, but very often the judge declines to enter into the case?—They are not really jury cases.

514. The Chairman.—Have you had your attention at all turned to the extent of drainage districts. We have had a good deal of evidence to show that a drainage district is termed, perhaps, on some of the upper reaches of the river, and it injures the lower part, or for want of improvement in the lower part the works are not so efficient as they might be. Have you had your attention called to that with a view to the desirability or otherwise of extending the jurisdiction of these drainage boards, say to the whole catchment basin of a river, instead of being confined to a portion of it?—My opinion is strongly that they ought to have the jurisdiction over the whole, and that is the reason I should be so anxious that the Board of Works, or the body that has the dealing with the money, should have the control in order to say what extent the districts should cover, or how many sub-districts should be comprised in one district.

515. By the present law the owners only can initiate schemes?—That is all.

516. Of course the owners are not likely to do it for the future?—No; not likely in the future.

517. And the occupiers probably are not so likely, but how would you put in motion, say the Board of Works. Who should take the initiative?—It is hard to force people to improve themselves. I do not know exactly how you could start the business, except as far as the main outlets are concerned.

518. Let me put it in another way. At present you have to get a certain number of consents before you can put the Board of Works in motion. Supposing it was provided that upon a memorial, signed by one important landowner, or important occupier, or more, the Board of Works should then be justified in sending down an inspector to judge for himself whether it is desirable?—I would reduce the present number of consents to a moiety, I think, unless a third objected. I would reduce the number very much, indeed, because I do not think that any body of men should stand in the way of a public improvement. I would say if a third were satisfied, that the Board of Works should then take up the matter.

519. Supposing there is a large landowner, who owns ten per cent. or twenty per cent. of the area of the district, would not you think that his voice ought to have sufficient weight to justify a preliminary inspection?—Quite so. Either he, or even a body of tenants—a third or a fourth of the district. I would make it a very small body, indeed.

520. For the initiative part?—Yes.

521. At present the law is that the memorialists have to deposit a sum of money for costs, and that is a great difficulty, I believe?—Yes, a great difficulty.

522. How would you deal with that?—I do not know that you could altogether do away with that, because it is a sort of check upon this sort of promotion. I do not think I would suggest doing away with that, but if the district were formed then it should be added as a part of the cost of the district.

523. It has been suggested that if the district were formed, then the preliminary expenses should form part of the cost?—Quite so.

524. But that if it failed it has been suggested that the State should bear the whole preliminary cost?—I think the Board of Works must have a staff sufficient for this, and really the expenses would not be very much.

525. But whether much or little?—I am afraid it ought to be borne by the promoters.

526. Then you get into the difficulty of inducing them to take the initiative, because they feel, sooner or later, they have to pay the preliminary expenses?—Quite so. It would be very generous of the Government if they would let us have the preliminary expenses.

527. Mr. Pim.—If the Government had a staff for this purpose of examination there would not be to that staff any considerable cost in going down and making examinations if it fell through?—Merely the expense of travelling.

528. Mr. Berry.—Do you think if no sum was deposited it would result in foolish applications to the Board of Works?—Really, I do not think it would. I think they would not rush into applications of that sort. I really think it is a matter of very small consequence. I think the Government might say they would make the preliminary examination themselves, because the costs, whatever they were, would be attached to the district, and for one case that would fail probably twenty would pass, and it would be hardly worth while keeping that sort of check over the applications.

529. Mr. Pim.—Does not the providing of that, though it might be a small sum of money at the start, tend to check the applications?—Unquestionably it does, and would check them more in future, because very likely these applications would come from the occupying tenants, and they are very chary about preliminary expenses.

530. Mr. Berry.—Do you think that a sum as low as £50 would check the initiation of schemes?—It possibly might, but I do not think it is worth considering. I think if the matter is going to be worked out on a broad principle altogether, it is hardly worth having any check of that sort. I believe there would be so few rejections that it would not be worth considering.

531. The Chairman.—In reply to the question put to you as to whether people would be so foolish as to make applications unnecessarily, you said you did not think they would. Would that opinion still further be strengthened by this fact that if the drainage scheme was carried out they themselves would be the taxpayers?—Quite so.

532. And consequently they are not likely to make foolish applications?—I do not think they are at all. I think it is not at all likely there would be any abuse of that sort. I am sure there would not.

533. Then as to the Drainage Board. Hitherto the Board has consisted of owners?—Yes; and of course that would have to be altered in the future to occupiers and owners too if they were occupiers.

534. But in these days you must consider that they would be elected by popular vote?—Quite so.

535. But would you attach a qualification to membership by the occupiers?—I think so.

536. To what extent?—I would take the highest rated. Whatever number formed the district board I would say six or a dozen of the highest rated.

537. Those six might not be the most intelligent people in the district?—I am afraid you would have to leave it at that.

538. Supposing you attached an assessment qualification to membership, how high would you put it?—£10, £20, £50, or what?—The qualification should refer to the occupiers of the land improved I suppose. A man having the largest area ought to have the largest vote, though he might not be the person highest rated under the Poor Law valuation.

539. When you want men of a certain position and

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certain intelligence and as a rule you attach value to a man's position in society and so on. For instance, one man may be assessed at £1, and another at £100 a year!—Quite so. You would have to fix some limit.

3623. Could you give an opinion as to what that limit should be?—In many small districts in Ireland there would not be a single rated occupier at £10.

3624. Mr. Pies.—In Donegal they are all small holdings?—Yes.

3625. Do you think any of those men would be competent to be members of a drainage board?—I would not select them if I could help it, but the tendency is to elect them on Boards of Guardians. The whole public bodies of the country will be in the hands of that class of men before long. I should say probably £10, but that would not meet the case of a district where there would be no £10 holders. I know lots of districts in Ireland where there is not a single tenant of that valuation.

3626. The Chairman.—Probably in that case it would fall on the landowners?—Possibly it would. It would be a great advantage if it would. In appointing the Associated Occupiers, as we call them—that is the men who sit with the magistrates on fiscal business—we always take the highest ratepayers, and invariably they represent the intelligence of the country. I should say, as a rule, that a £10 valuation would be something like what would apply; but it would have to be modified in some cases. I believe the Board of Works would determine that according to the district they were working in. In fact, at the present time I think they have the power of determining the qualification. I think there are clauses in the Act of 1863 under which they constitute the first board and determine the qualification.

3627. Mr. Barry.—Do you think there is a general feeling of confidence in the Board of Works?—I have never found anything different. I have been inspector under the Drainage Acts since 1847, and all the Land Improvement Acts all over the country. I had the counties of Down and Donegal under my charge until I had to give them up, and I never found any dissatisfaction. There is no doubt that a great many gentlemen who ask for a loan of money think they ought to walk into the Board of Works and get the loan put in

their pocket and walk away again. They do not make allowance for the responsibility of the Commission—that they are bound to inquire very carefully and see the security is all right and the money properly expended. In a great many cases they advance the first instalment and cannot get that carefully expended, and then they refuse to give any more, and then there is a cry out about them that they are red-tapeists. There is not a body of men in the world who devote themselves as anxiously to facilitate all improvements as the Board of Works Commission. I have been associated with them more or less for forty years.

3628. Mr. Pies.—You think that no reasonable one is refused?—No; quite the contrary. They strain every power they have to meet every fair application. I am aware of it myself personally.

3629. Would you suggest as regards the voting power that every voter should have an equality of votes, or would you give them votes in proportion to the value of their share of the land improved?—I think they ought to have cumulative votes.

3630. The same as it is now in the case of the landowners, when you give the votes to the occupiers?—I certainly should. I should let the parties most interested have the most voting power.

3631. It has been suggested that the Board of Works should nominate some representative to each drainage board, seeing they are the lenders of the money?—I think so too, and I think that the Board of Works ought to be bound to inspect the maintenance districts every year, because some of these districts are not maintained. They are let run back for years, and then somebody complains, and then the Board of Works sends somebody down, and then they take it up and do it; but I think they ought to be bound to see that the maintenance is properly kept up, and that a public auditor should examine the accounts of the District every year.

3632. The Chairman.—Are there any further remarks you would wish to make?—I think I have discussed almost every point therein in this document. I look upon arterial drainage and the opening up of the country by turnpikes or light railways as being the most important things for the country.

The witness withdrew.

Dr. John William Moore, M.D., F.R.S., F.R.C.S., &c., Dublin, called in and examined.

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William  
Moore.

3633. The Chairman.—We have had a great deal of evidence and many suggestions as regards the climatic improvement which would result from a general system of drainage throughout Ireland. I understand that you have paid some attention to the subject, from a climatic and sanitary point of view?—I have.

3634. Will you, in your own words, describe the opinion you have arrived at?—In the first place I have kept a record, more or less complete, of the conditions of weather for about twenty-five years, and it was subject to which I have paid a good deal of attention. With regard to the actual rainfall of Ireland, it is really not so great as the rainfall over a large district of Scotland, and also some portions of England. I have brought with me a map, which I thought would be of interest to the Commissioners, by Mr. Alexander Bracken, the secretary of the Scottish Meteorological Society, and on that map he represents, by different colours, the amount of annual rainfall over the entire of the United Kingdom. The dark blue colour shows the heaviest rainfall, the red the average rainfall; and the pink the smallest rainfall. Now, you will see at a glance that over Ireland the dark blue does not figure at all, whereas it is present over a very large district of the West of Scotland. The dark blue represents a rainfall of 80 inches or upwards per annum. Now, the rainfall in Ireland varies from a little below

80 inches in the immediate vicinity of Dublin. You will see a small triangle round Dublin. There that rainfall is under 30 inches, and it increases from that small amount, comparatively, to from 50 to 60 inches over the north-west and west parts of the country. Although the rainfall in Ireland is not excessive, no one can deny that the climate is very damp, and that the number of rainy days is excessive. The rainfall in Ireland is distributed over a great many days. In the west of Ireland it is distributed over about 220 days. In Dublin rain falls, on the average, on 194 days. This comes the question, why is it that the climate of Ireland is so very damp? I have no hesitation at all in saying that it is owing to the lodgment of water, to a great extent, over the country. There can be very little question that this lodgment of water acts prejudicially in various ways. In the first place, in summer excessive evaporation takes place from this lodged water, and in the process of evaporation heat is made latent, so that the summer temperature is at once thereby reduced. Next, the vapour which rises from this lodged water tends to form clouds, and so the climate is impaired by a diminished sunshine, owing to the increase of cloud. If there were some system by which the lodgment water could be quickly drained off from the country, I am satisfied, firstly, that owing to diminished evaporation; secondly, owing to diminished cloud; and thirdly, owing to the heating of

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the dry surface—because dry surfaces heat much more quickly than moist surfaces—we should have a higher summer atmosphere in Ireland. At the same time it is right to say that the winter temperatures would probably be a little colder, because over dry land in winter, temperatures fall, of course, more quickly.

3633. Do those meteorological tables show the average temperature in the three parts of the kingdom?—Yes, that is a paper only on the rainfall of the British Islands, but I have here a very interesting series of tables of temperature. It is a meteorological atlas of the British Islands, published by the authority of the Meteorological Council, and in it we have the isothermal lines for every month in the year. We have also in that meteorological atlas, tables of the atmospheric pressure for each month, and we have at the end a table of the annual rainfall.

3635. The large figures are degrees of temperature?—Yes, degrees Fahrenheit.

3636. Then I observe by this that Ireland, taking its entirety, has a higher winter temperature than England or Scotland?—Certainly, especially along the west and north-west coast.

3637. I do notice now below  $40^{\circ}$ — $39^{\circ}$  in Kildare and  $39^{\circ}$ — $40^{\circ}$  at Arragh. Those are the lowest temperatures in January. The corresponding values are  $37^{\circ}$  and  $36^{\circ}$  in the north-east of Scotland and east of England.

3638. England seems from this to be colder than Ireland?—A great deal colder in January, and warmer in the summer months.

3639. Mr. Abercrombie.—This is simply in January?—Yes. Now, in June you find the isothermal line of  $64^{\circ}$  embraces London. In Ireland the highest temperature is  $63^{\circ}$ , that is in the neighbourhood of Malin, north of Cork and Tipperary; that is the warmest part of Ireland. The high temperature in the south of Ireland is more due to a clear sunny atmosphere than to direct sun heat. This  $63^{\circ}$  is produced by moderately high temperature by day, and very high temperature at night. There is very little radiation at night. In England, on the contrary, the high isothermal is produced by the sun's heat during the day. There is a comparatively low temperature over England at night. In a word, the climate is more continental.

§ 40. The Chairman.—Practically there are  $3^{\circ}$  difference?—Yes.

3641. Then, is it your opinion that owing to the dampness of the soil in Ireland the temperature is  $2^{\circ}$  lower than it is in England?—That will not account for the whole of the difference, but it will for a great deal. If we could dry the soil of Ireland, the effect of drying the soil would be to produce a greater range of temperature in summer—a lower temperature at night and a much higher temperature by day.

3642. Mr. Fies.—Is that the mean of the twenty-four hours which we have here?—Yes, the mean of twenty-four hours for the whole month.

3643. But for ripening corn, the heat by day and the cold by night are much more effective than an average?—Yes; extreme sun heat by day is what is needed to kill and burst the grain. Then there is just one other point that I think would be of interest. These are the rainfall tables of the British Islands, published by the Meteorological Council, and these are of special interest to this Commission, because they show the drainage areas of the different rivers (standing in acres). For instance, the river Barrow has a drainage area of 3,410 square miles, and the River Shannon of nearly 7,000 miles. Then there is another point I should also like to mention. My friend, the late Dr. Lyons, was very anxious to have each district in Ireland planted. There can be no question that if the bogs of Ireland were planted with pines or firs, the first effect would be a considerable drying of the soil, because these trees would soak up the water that is lodged in the soil; but the ultimate result of extensive forests over the country might be to increase the rainfall. The first result might probably be to dry

the soil, but the ultimate result would be to increase the rainfall.

3644. In what way does a forest increase the rainfall?—In the first place it cools the air. It prevents the summer heat acting on the surface. If very extensive tracts of the country were covered with forest, it would prevent the increase of summer heat. I am contemplating the result if the bogs were drained; but I think it would be a great thing if the bogs were planted. Want of rain will never be a grievance in Ireland. The position of Ireland is this. It is the first high land between a great ocean lying to the west, and a continent lying to the east. In winter the air over the continent, of course, is very cold, and the air over oceans is relatively warm; then the general set of the atmosphere being from south-west to north-east, or from west to east, the warm vapour-laden air over the Atlantic ocean, when it meets with the high lands of Ireland, is condensed, and the result is a continual tendency to drizzle.

3645. To what extent is the temperature of the British Isles due to the Gulf stream—how many degrees?—The excess of temperature due to the proximity of the North Atlantic is about from twenty to thirty degrees. On the extreme west coast of Ireland the mean temperature in January is about twenty degrees higher than it would be but for the Gulf stream. It is, however, not only the Gulf stream, but it is the set of the wind over the Atlantic which raises the temperature.

3646. Still that is the wind passing over the Gulf stream, is not it?—That is quite true, but what happens is this. In winter, owing to the fall of temperature over Central Asia and Europe, the pressure of air rises there to a very considerable degree. The average pressure in Siberia, for instance, is about  $30\frac{1}{2}$  inches. It is quite clear, if the air is piled up there, it must be drawn from other districts, and the other districts are substantially large ocean surfaces, so that systematically between the British Islands and Iceland there is a low barometrical pressure. The pressure over the Atlantic in that region is only  $29\frac{1}{2}$  or  $29\frac{3}{4}$  inches, or, in other words, more than an inch lower than it is in Siberia. In accordance with the meteorological law the air circulates round areas of low pressure against the banks of a watch in the Northern Hemisphere, and so a prevailing current from south west to west keeps blowing over the British Islands. The Gulf stream has a great deal to say to our climate, but the prevalent W. and S.W. winds have also a great deal to say to it. The general tendency of the air-current is from south west to north-east; it sweeps round over the British Islands in that direction.

3647. Mr. Barry.—Is not there an important equatorial current?—Yes; but the so-called equatorial current does not come from equatorial regions at all. It really comes only from the Atlantic Ocean.

3648. The Chairman.—Do you agree with the modern theory of some of our meteorological brethren on the other side of the Atlantic, that the great bulk of the rainfall not only in Europe but over the Atlantic, comes really from the Pacific across the Continent of America. That the water that falls in Europe generally, and the British Isles, comes practically across the Continent from the Pacific. I merely ask you if you agree with that which is the modern theory?—I have heard that theory, but I imagine it is very difficult to prove. You have the immense barrier of mountains running from north to south across the American Continent—the Rocky Mountains, and any vapour that escapes being precipitated on either face of these mountains, must be very insignificant in amount. I think the rains of the east seaboard of America, taken their origin partly in the Gulf of Mexico and partly in the Atlantic. There is an indraught of air all along the eastern seaboard.

3649. You are aware that the rainfall on the west of that range of mountains in America is very small comparatively?—In Vancouver's Island it is more than it is here. It is about forty-five inches a year.

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 William  
 Moore.

3650. What if you get south of that?—At San Francisco, there is a small rainfall.

3651. And down the South American coast?—Yes; we have got a large enough reservoir in the Atlantic ocean, I think.

3652. Mr. Barry.—Going back to the drainage of land. In summer time—take July—when these isothermal lines are laid down, is there any large quantity of unsaturated or moorish land in Ireland?—Well, we have as a standing supply the bogs. I have seen the bogs in all seasons of the year in Ireland and even in the middle of summer there are vast quantities of water lodged in the bogs.

3653. They are like a sponge?—Yes.

3654. Mr. Pies.—In a state of saturation?—Yes. Incidentally I may state a curious fact with reference to that. So far as the lodgment of water in these bogs is concerned Ireland ought to be full of intermittent fever—ague—but the peat seems to have an anti-malarial tendency. That is a curious thing; but there are vast quantities of water in all these bogs in summer.

3655. Mr. Barry.—I suppose the great chains of lakes have an effect?—Yes.

3656. The great floods take place at other times of the year?—I think this is what is to be said. The summer rains are more torrential in character. More rain falls in a short time in summer than it usually does in winter. In winter it is a case of a continuous drizzle, but in summer you have heavy thunder rains or heavy showers passing over the country.

3657. But in the winter, in many parts of Ireland, something like a tenth of the area of land is under water in certain districts?—Yes.

3658. That would not be the case in the summer?—Not to the same extent, I admit, but still there is a great deal too much lodgment of water.

3659. Are there any readings in places in Ireland which are not affected by large expanses of water in the summer months?—Within the district embraced by the isothermal line of  $63^{\circ}$ —there is not much water there. There is not much in the north of Cork or in Tipperary. It is rather a hilly part of the country—the Tipperary and Waterford mountains.

3660. There you find an isothermal line of  $62^{\circ}$ ?—Yes; we should be much warmer in Dublin than in that district, were it not for a curious local phenomenon, that is the local sea breeze that comes in off the Irish Sea in the hot weather in summer. I am sure Mr. Pies must have often noticed that, after the morning has passed by, a light easterly midnight will take place. I have drawn attention to that in this pamphlet on the "Climate of Dublin" (submitted).

3661. Mr. Pies.—We have this peculiarity that the average temperature of Ireland is high in winter, when there is a much greater area of the land covered with water?—Yes.

3662. And that it is low in summer when the water has disappeared to a large extent from the surface?—The reason of that is this. The temperature is high in winter owing to the proximity of the Atlantic, and the prevalent S.W. winds. You can see the prevailing wind in the January chart. The influence of the ocean here is unmistakable. The isothermal lines run from south to north instead of running as they should from east to west; and the further you get from the Atlantic the colder it is. The heating effect of the Irish Sea is seen by curious projections of the isothermal lines from S. to N. over the Irish Sea. Between Dublin and Holyhead it is much warmer than in Dublin, owing to the sea. The way to look at it is this, that if you drained Ireland and had the whole country with less stagnant water, you would diminish the winter temperature. It would be colder in Ireland than it is at present, but it would be a pleasant sort of cold.

3663. Mr. Pies.—But the prevalence of cloud in winter keeps the country warm by preventing radiation?—Yes.

3664. Which is the greater—the evaporation by sun acting upon water, or by sun acting upon saturated land?—For greater on saturated land. There is one point that does not really concern any special subject, but it is this. I believe that if these river basins were more efficiently drained there would be a greater risk of occasional floods—the discharge of water after heavy rains being so much quicker. However, that is an engineering question.

3665. Mr. Barry.—Have you turned your attention at all to the effect of a loss of temperature of  $1^{\circ}$  or  $2^{\circ}$  on the ripening of certain crops?—Not directly, but I can very well imagine what it is from the returns of the Meteorological Council.

3666. Mr. Abernethy.—The prevalence of cloud that you speak of keeps off the summer sun to a great extent?—Yes, the ripening sun. There would be a great deal more corn grown in Ireland, if we had a summer temperature of  $2^{\circ}$  higher.

3667. Mr. Pies.—Following up the question I asked you, about evaporation from water surface and a saturated surface, you say it is greater from the saturated surface. Would not it follow from that, that the injurious effect on the climate of Ireland would be really greater from saturated soil relatively than from surface covered by water?—There is no question that it is.

3668. That is, the effect that evaporation causes on the climate is greater in the summer?—Far greater. One reason manifestly being that the sun is higher in the heavens and longer above the horizon, and the process of evaporation is much more rapid and much more extensive.

3669. There are three large rivers in Ireland that flood a large area, the Barrow, the Shannon, and the Bann, specially referred to us. Have you any figures that would show whether in those districts the temperature varies from the district that is not under the immediate influence of the Barrow, the Shannon, or the Bann?—I think the July chart will show that. I know the Barrow very well. I have often crossed it and been horrified at the state of the country. It seemed to me like one vast lake; and I have seen the Shannon in flood too.

3670. What I mean is this. Are there any records kept sufficiently numerous that would show whether the flooded basin of the Barrow is, on the average, colder than the surrounding area that is not in proximity to the flood?—I am not prepared to say that; but here is a very curious thing. You know where the Bog of Allen is, and you notice that right across the Bog of Allen there is a distinct dislocation of the July temperature; in other words, this isothermal line of  $61^{\circ}$  is not completed, but seems to stop short there. It is between  $60^{\circ}$  and  $61^{\circ}$ , and here you have a rapid rise of temperature as you get to the drier portions of the country—that is Tipperary, Cork, and so on.

3671. Then, what this shows is, that a belt right across the middle of Ireland, between Dublin and Galway is, on the average, colder in July than it is north or south of that belt?—Yes, and that is a very remarkable thing.

3672. And that belt appears to spread northwards up the valley of the Shannon?—Yes, but strictly speaking, if you look at the case of England, the hottest part of Ireland in summer ought to be just in the King's County, Queen's County, and Kildare. I think it is the Bog of Allen that reduces the temperature across there.

3673. That the area you have just mentioned is kept cold by the Bog of Allen?—Yes. If you could drain the Barrow and a certain quantity of water from the Bog of Allen, and also drain the Shannon and reduce it in this direction, you would have this isothermal line of  $62^{\circ}$  embracing the whole of Ireland in July.

3674. Mr. Barry.—Looking to the fact that Ireland is so very much affected by the Atlantic, do you think that there would ever be a chance of the

climate of Ireland being as high as the climate of England?—It never would. The summer will never be as warm in Ireland as in England. There is no question about that, because England has a much larger land surface to begin with, and that is one of the principal factors in the production of summer heat.

3675. Large islands are less affected by the ocean than smaller ones?—Yes; the climate is more continental. It is colder in winter and warmer in summer—the extremes are greater.

3676. Still you think that a substantial benefit would result to Ireland from a more efficient system of arterial drainage?—I am convinced of that.

3677. The *Chairman*.—We merely wished to know whether the drainage would, in your opinion, affect the temperature to any appreciable degree. You have kindly given us your opinion upon that point, but how we can make it available I am not prepared to say?—I have been only too happy to afford you that information.

3678. Mr. Pies.—Can you say what, in your

opinion, is the result upon the health of Ireland of this condition of affairs consequent upon the floods?—I think if more effectual drainages were carried out there would be less pulmonary disease, and the prevalence of rheumatism would be diminished particularly. Intermittent fever is not prevalent in Ireland, probably, as I have mentioned, owing to the anti-malarial effect of the peat.

3679. The *Chairman*.—There is a general impression that the climate of Ireland is more relaxing than that of England—whatever that may mean?—It is; it is more enervating.

3680. Does that induce disease?—It predisposes, I have very little doubt, to disease.

3681. You think that there is a more relaxing influence in Ireland than in England?—Yes; if it were only the clouded skies it would bear out that opinion.

3682. Is it the moisture that partly produces that?—Partly the moisture, and partly the clouded sky.

The witness withdrew.

Am. 12, 1887  
Dr. John  
William  
Moore

Mr. Thomas Ferry called in and examined.

3683. The *Chairman*.—Where do you reside?—Belmont, King's County.

3684. I believe you desire to explain to the Commission some damage which you have sustained?—Yes.

3685. Will you proceed to explain to us what it is?—The best explanation I can give is a written statement which I submitted to the Commissioners some time ago, I do not think I can put it forward in plainer words than those.

3686. Perhaps you will read that letter to us?—It is dated the 15th November, 1886;—

"In reply to your letter of the 5th instant, requesting particulars of damage to the river known as the Langer Lough, caused by flooding between Belmont Mills and the Shannon, I beg to refer you to the enclosed copy of report of Mr. MacMahon, Engineer to the Board of Works in the year 1846, where, at page 13, he gives a description of the then state of that portion of the river, and at page 14, wherein he describes extensive and baneful works which he proposes to carry out on the reach of river, which he considers essential to form an efficient outlet for the extensive works to be executed to the westward of this reach. All these works included in Mr. MacMahon's report, with the exception of this one reach of river, have been done, and, in addition, five other drainage districts have also been executed, and the course of the very extensive reach of river basin is now drained, and all the rivers and drains included in these six districts, comprising hundreds of miles in length, are usually cleared and well-kept, whilst the portion from Belmont bridge to Moywood bridge, a distance of only two statute miles, has never had anything done to it, or been improved in any way. Consequently the portion of the river channel is quite inadequate to discharge the vastly increased floods to which it is now subject, and its condition is very bad, as it is nearly filled up at present, is getting worse from day to day, and rapidly filling with the deposits brought down from the higher reaches. Various attempts were made from time to time to form a drainage scheme under existing Acts of Parliament, to remedy this evil, all of which proved to be ineffectual, as the expense attending same was too large for the extent of the evil to be improved."

That gives all the particulars of the damage to the river, the remainder of the letter bears on some negotiations carried on with the Treasury.

3687. You have your own individual complaint to make that the works have not been carried out, and that that has injured you?—Yes.

3688. Did you not receive compensation?—Yes, I applied to the Treasury, and placed the matter before them, and they stated that the Government could not interfere in carrying out any works to improve the river, and they gave me a certain sum of money as compensation, which I accepted, under the circumstances. At the time they said they were not in a position to get the work done. I suppose there was no Act of Parliament that enabled them to do it.

3689. What is it you want now?—I want to see if the river can be done now?—It is in a very bad way, indeed.

3690. Though you have received compensation?—The compensation is not at all adequate to the amount of damage done.

3691. It was thought so at the time by the Government who gave the compensation?—They may have thought it sufficient, but I applied for a very much larger sum, and I thought the damage done to my place was very much more than that; but regardless of my mill altogether, the river is in a very bad way, and it is a bad thing for the whole country. Under the present Act of Parliament I do not see much chance of anything being done to it.

3692. You received and acknowledged the receipt of an amount paid to you as full compensation—did you not?—Yes, I was obliged to do it.

3693. Then is not the question of the improvement of the river rather more with the large body of owners and occupiers of land in that district than with you as an individual?—But the number of owners in the district is so small that the cost of doing the river would be too great to be levied on the few owners in the district.

3694. Perhaps that was taken into account when the Government awarded you compensation?—The Government awarded me compensation for my case only—not on the general damage done to the land below our mills.

3695. Mr. Pies.—In what way are you damaged?—It is as a mill-owner or land-owner?—As both.

3696. Is your wheel drowned so that it will not work?—My wheel is drowned so that it will not turn.

3697. Is it drowned to a greater extent now than it was before the damage was carried out?—Yes, the flood comes down so rapidly now that it stops the wheel after one night's heavy rain. As Mr. MacMahon states in his report, six or eight districts were thrown into the river from time to time, and the catchment basin covers an area of 600 miles, I think, and it was finished as far as our mills at Belmont bridge. There are only two miles from us to the Shannon, and there was nothing done on them.

3698. Mr. Ferry.—Has no estimate been made of what it would cost to improve the river for that two miles?—There was at the time the Treasury gave me the compensation.

3699. Do you know what it was?—I think it was £3,000.

3700. The *Chairman*.—What did you receive?—£2,500. I claimed £4,500, and they gave me £2,500.

3701. Mr. Ferry.—Supposing a scheme was made would you sacrifice the money you received for com-

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Ferry.

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permission to improve the river?—Well, I don't think I ought to be asked to contribute this money which I received, because I have sustained a larger amount of damage previous to that, and since I had the compensation. The damage is getting worse every year.

3702. Mr. Pies.—When did you receive the damage?—It has been damaged for twenty years.

3703. Did not you say something about a report in 1846? Were the drainage works carried out then?—They were not completed in 1846.

3704. When were they completed?—I think about 1860 or 1861.

3705. So that from that time to the present you have been suffering that damage?—I have been suffering ever since, because there have been additional districts carried out from time to time which have increased the injury.

3706. The Chairman.—When was the compensation paid to you?—In 1883.

3707. Was it after full inquiry?—Yes, it was very fully gone into.

3708. Before whom?—I suppose before the Board of Works. I applied to the Secretary of the Treasury.

3709. Mr. Abernethy.—That was chiefly for your wheel being drowned?—Yes.

3710. Has it been drowned worse since 1883?—I do not think it has been worse since 1883.

3711. Mr. Pies.—Was that compensation understood by the Board of Works or the Treasury to compensate you for the loss you had already received and also for prospective loss?—Yes, I signed an agreement to the effect that it was full compensation for the loss sustained.

3712. The Chairman.—I think you purchased your mill in 1830?—Yes.

3713. And that was after the drainage works had been done?—After they had been commenced, but not completed, for some then two or three other districts have been added on.

3714. Still you knew these drainage works were going on when you bought the mill?—Yes.

3715. The drainage works commenced in 1846, and you bought the mill thirteen years afterwards, and received compensation to the extent of £3,500?—I did not say the drainage works commenced in 1846. This report of Mr. MacMahon, the engineer to the Board of Works, was written in 1846, and subsequently to that the drainage was carried out. I do not think it was commenced till several years after that.

3716. Well a considerable portion of the drainage works must have been in operation in 1859?—Undoubtedly.

3717. And that was the year in which you bought the mill?—Yes.

3718. Then I fail to see on what ground you can consider yourself in any way injured?—I consider there is a very great grievance in allowing the river to remain in such a state as it is at present.

3719. That is a general grievance of the whole community?—Certainly.

3720. Mr. Pies.—What is the area of land that is flooded there between you and the Shannon?—I should think in round numbers it must be from 80 to 100 acres; but that is a guess. I cannot tell you exactly.

3721. Then it would take about £40 an acre to drain it?—Yes, provided my statement of the coverage is correct; but I could not vouch for that. I think that unless some opportunity is taken advantage of like the present the river never can be done. It will be getting worse every year.

3722. The Chairman.—Knowing only during the last half hour anything of the circumstances, it seems to me that it rarely must have been taken into account by the engineer sent down by the Board of Works as to the extent of the damage done to you. He estimated that at £2,500; you have been paid that, and if you require the river to be improved, is it not only right that you should contribute by far the largest portion? I presume you are the only one who has received

compensation?—I am the only one who has received compensation.

3723. At whose expense would you say that the improvement to the river should be made?—I thought that under the present circumstances the Government were likely to spend some money in cases of this kind, which could not be done otherwise. If I am to be assessed to pay a portion of the improvements I should much rather pay the portion than not have them done.

3724. You say that the people in fact are very few in number, and you have received very large compensation?—Not at all adequate to the damage done.

3725. Mr. Abernethy.—You have stated in answer to my question that the compensation was chiefly on account of your wheel being drowned?—Yes.

3726. And you state that it has not been drowned any more since?—It is not worse?—Well, I do not know that it is actually worse, but it is likely to get worse, because if something is not done to the river it will get choked up altogether. It is not at all opened up, and there are no means for the water getting away in flood time.

3727. The Chairman.—To put it in plain language, if the improvements would cost £20,000, and you have received £2,500 for compensation, surely it is your duty to spend the £2,000 in improving the river, which would remedy all you have to complain of?—Well, I don't know about that. The compensation I got, as I mentioned before, does not at all adequately compensate me.

3728. You bought your mill after the works were partly completed?—My idea is that, putting the mill out of the question altogether, something ought to be done to the river for the good of the public.

3729. That is a different matter; but I fail to see what personal grievance you have to complain of, when you have received full compensation for the injury you have received?—My case is that I am anxious to get the river improved, and I think the present would be a good opportunity to have it done. If it cannot be done at the present opportunity, I do not see that it ever will be done, unless some special Act of Parliament is passed to meet cases of the kind.

3730. Mr. Pies.—You think that the local owners of property there would not be willing to contribute the cost of carrying out the improvements?—I do not think they would.

3731. Including yourself amongst the number?—Yes; I do not think they would.

3732. The Chairman.—In that case I do not see what is to be done. If the owners in the district will not come forward you cannot expect the Government to find money to remedy everybody's grievance in Ireland?—I think it is a special grievance. There are very few cases of this kind.

3733. In which people have received compensation?—Yes; but nevertheless the river is getting worse every day, and if it is choked up altogether I do not know what is to be the result of it. This portion of the river originally should have been included in the upper districts by right to make an outlet for the water below as well as above. If other districts are thrown into the river above our place, and no outlet is made for the water, I think it is a great grievance. Although I got the compensation which I freely admit, I must say it was not at all adequate for the injury done. They are very peculiar circumstances, and under the circumstances I thought that the Government would be disposed to spend some money on it.

3734. Mr. Barry.—Is your mill a corn mill?—Yes; I have two mills—a flour mill and a corn mill.

3735. What fall of water have you?—In summer time seven feet fall and in winter it goes down to about three feet.

3736. What fall is there between that and the Shannon?—It is stated in the report. From Belmont



bridge to Moystown bridge it is five feet four inches. That is in Mr. MacMahon's report, page 13.

3737. The Chairman.—We shall have the evidence before us, but at present we are not in a position to give you any further advice than we have done, but I think as you have received compensation to a larger extent than it would cost to remedy it, it is incumbent on you solely to take steps to remedy the evil.—I should be willing to contribute towards the improvement of the river, but unless your Commission interfere, or Government interfere in some special way, there is no possibility of getting the thing done.

3738. I suppose the Board of Works have hitherto refused?—Yes; the Board of Works refused to entertain the thing at all. They said it was not a thing within their power, and that they had no power to interfere. I have been at it for the last twenty years to get something done, and I have failed so far.

3739. Mr. Pies.—How was the sum of money you were paid arrived at?—They asked me to furnish a claim and I furnished a claim and made a calculation as close as I could. I claimed £4,500.

3740. To whom did you send that claim?—To the Treasury.

3741. Was there anyone sent to inspect the place?—Yes, they sent the engineer to make a survey and estimate the cost of repairing it.

3742. The Chairman.—Mr. Kane was sent, I think?—Yes.

3743. Mr. Barry.—You mean that under the present law, if you were disposed to contribute £2,000 there are no means of carrying the work out?—No; none whatever. If the river was filled up completely below I could not interfere at the least.

3744. The Chairman.—I don't think you understood the question. Supposing the £2,000 would remedy the evil you complain of, there is no drainage body in existence to carry out the works?—No; no drainage body in existence and no scheme started.

3745. Should you not take steps to form one and could not succeed, because the cost was too great to get it done?

3746. £3,600?—The cost to be levied on the land.

3747. Mr. Pies.—What was the estimated cost for doing the work?—£3,000.

3748. And the other owners in the neighbourhood would not join in the scheme because their contributions would be too heavy?—Yes; some of the owners are careless about it, because they are country gentlemen. Some would go so far as to say it would interfere with their shooting if the floods were taken off the lands.

3749. The Chairman.—Whatever may be done you have received your full compensation?—Yes; I have received compensation, but I want to get the river done in addition, if I can.

3750. If you offered to make a substantial contribution towards the cost of doing the work, do you think you could induce the neighbouring owners to join with you in getting it done?—I think it is very doubtful whether they would or not.

3751. The Chairman.—As I understand the estimate of the increased value of the land, supposing the work were done, is £1,700, and it will cost £3,000 to effect, is that so?—I do not know anything about the estimates that the engineer prepared. I heard casually that it was £3,000.

3752. And the improvement of the land would be £1,700, leaving a deficiency of £1,300?—I am not aware of that.

3753. Seeing that you are the only person who has received compensation, and that to the extent of £4,500, is it unreasonable to ask you to subscribe the £1,300, or the £1,500, if that should be necessary to complete the works?—Of course I would contribute rather than not have it done.

3754. The present law enables you to take steps to do so?—If I cannot succeed in getting a district formed I do not know how I am to get it done.

3755. How many are interested in it?—I do not suppose there are more than four or five proprietors between me and the Shannon would be interested. They have not got the same interest now in carrying it out since the last Land Bill was brought out.

3756. How many occupiers are there?—I have not got a list of them. I suppose not more than seven or eight occupiers that have the flooded lands.

3757. Mr. Pies.—That is tenants?—Tenants, the case is such a peculiar one. The difficulty in getting it done has always been so great that I thought very likely your Board would be disposed to recommend the Government to spend some money on it. It is only two miles of river, and it is clearly shown that there are hundreds of miles of river above that which have been drained into this one spot.

3758. Mr. Barry.—Are we to take it that your complaint is that the law does not enable you to carry the work out if you find the money, or that you want somebody else to carry out the work at their expense?—My idea is that, considering the nature of the case, the Government ought to furnish the money themselves.

3759. The Chairman.—Why?—Simply because the Board of Works should have provided for the water to be carried out beyond the Belmont bridge from the district behind it.

3760. How is the Government to get repaid any money it advances?—I could not answer that. When a drainage district is formed in any river they ought to get an outlet for the water beyond.

3761. Who ought?—The Board of Works, or whatever district is relieved by it.

3762. Is not the whole principle of the Drainage Act that the owners shall contribute annually such a sum of money as with interest will repay the principal in a certain number of years?—Yes, certainly.

3763. What are the Government to do beyond that?—I think the Government have no right to go and drain a district above other people and flood them.

3764. The Government have not drained it, but these people themselves who have subscribed the money to drain it?—But they did it under the sanction of the Board of Works. They could not do it without the Board of Works, and as I have said the Board of Works should provide for the outlet of the waters below as well as above.

3765. Mr. Pies.—How did it happen originally that that portion of the river was outflung?—At the time the drainage districts were formed first of all, there were two or three other mills behind ours—between Belmont bridge and the Shannon—which were working then, and it would have cost an immense amount of money to buy them out. But those are all discredited now and are not working, and consequently it could be done for a twentieth part of the money now that it could have been done for then.

3766. You appear to feel that you have got a double grievance—one is that the amount of compensation you got was insufficient, supposing nothing else is going to be done for you; and even if it were sufficient, you have no legal power, supposing you devoted the whole sum of money you received to enable you to clear out the bed of the river so as to relieve you from flood?—None whatever; and the river is getting in a very bad way indeed. Some parts are getting filled up altogether, and some islands which have formed at Moystown bridge two miles below me are getting covered up with brushwood almost ready to meet across. The whole thing is stated so plainly in Mr. MacMahon's report that I do not think I can improve upon it. If the Government could be induced to spend a sum of money on it, it would assist the matter very much.

3767. Mr. Barry.—I suppose you know that Commission has no power to spend any money?—I am not aware exactly of the particular object of this Commission.

3768. This Commission is only one of inquiry?—

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Perry.

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Mr. Thomas  
Perry.

But I think the Commission could recommend certain works being done, and certain works being improved.  
3769. The Chairman. — Our mission is simply to inquire and not to spend!—I was not aware of this. I thought you had the power of recommending certain improvements being carried out in particular cases.

3770. Mr. Pies. — We have power to recommend improvements in the law to enable works to be carried out!—I did not understand that.  
The witness withdrew.  
Adjourned till to-morrow.

Jan. 23, 1856.

## TWENTY-THIRD DAY—WEDNESDAY, JANUARY 12TH, 1857.

AT 36, MERRION-SQUARE, DUBLIN.

Present.—Sir James Allport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq., and J. T. Pies, Esq.

Mr. Edward O'nei (Secretary); Mr. Atkinson (Trustee); and Mr. O'Neill, (Engineer), of the Lough Neagh Drainage District. Captain Gleeson, and Colonel Leslie (Trustees); and Mr. Graham (Superintendent of Works), of the Lower Bann Navigation District, were called in.

Mr. Edward O'nei examined.

Mr. Edward  
O'nei

3771. The Chairman.—I believe you are the Secretary of the Lough Neagh Drainage District?—Yes.

3772. I observe that you have a written statement. Will you put the Commission in possession of what you have to state?—I have some notes here; but the fact is that beyond putting the views of the trustees before you, I can really give very little evidence. The trustees of this district, as you are aware, are elected by the proprietors who contributed a large sum towards the carrying out of these works, and by whom the works are maintained. The view that the trustees take of this case is that these floods are chiefly caused by the state of the Lower Bann river, and with reference to that point I would refer you to Mr. Manning's reports. In his report of the 8th of June, 1877, you will find he states:—"All the circumstances stated point, therefore, distinctly to the fact that the channel at present is much less efficient than at the completion of the works."

3773. Mr. Barry.—Would you give us the precise boundaries of your district?—I have not got the map with me.

3774. Could you explain them, so that one could follow them on the map. Are they shown on the Board of Works map, accompanying Mr. Manning's report of the 18th March, 1884?—Yes; this is Mr. MacMahon's map that I have got, but it is the same.

3775. Mr. Pies.—Is the whole catchment area of the Bann improved. I see it is marked "entirement area"?—Yes.

3776. Mr. Barry.—Then we can refer to it as the map accompanying Mr. MacMahon's report?—Yes. The only thing I wish to call your attention to is that remark in Mr. Manning's report of 1877, which is at page 5. It says:—

"All the circumstances stated point, therefore, distinctly to the fact that the channel at present is much less efficient than at the completion of the works, and there can be little, if any, doubt that the increased height of the water in recent years has arisen mainly, if not entirely, from this cause."

Then again, on page 6, he says:—

"But if works be essential to restore the channel between Toome and Portora to the state in which it was given up to the trustees, there are reasonable grounds for the hope that the same successful results will arise as in the period of twelve years—from 1854 to 1868."

The trustees, I find, according to the minutes, after reading this report, directed their engineers to examine the weir basins and shoals, and to take such cross sections as would enable him to report on the present condition of river as compared with that in

which it was left by the Board of Works. The engineer presented his report on the 14th December, 1877, and in it he stated that the accumulations in the Lower Bann river interfere seriously with the discharging capacity of the channel, and he estimated the amount of excavation necessary at Toome lower basin at 58,000 cubic yards. This report was adopted by the trustees, and on the 22nd February, 1878, they entered into a contract for dredging, and they expended a sum of £3,500 for dredging out those weir basins.

3777. Mr. Abernethy.—Was that at Toome weir?—That was at Toome weir.

3778. Mr. Barry.—In what year did they spend that?—It was in 1878. The contract was entered into on the 22nd February, 1878, and the last payment I find, by reference to the books, was made on the 6th August, 1878.

3779. The Chairman.—Who is Mr. Graham?—He is the superintendent of the works of the Lower Bann.

3780. Mr. Pies.—Was it the trustees of the navigation who spent this money?—The trustees of the drainage district. There are certain portions of the Lower Bann river, about two miles and a half, under the charge of the drainage trustees, and it was the drainage trustees who expended that sum in dredging out that portion of the river.

3781. Have you jurisdiction at other weirs below Toome?—We have jurisdiction over the weir basins at Toome, Carron, and Moyvaughan. They are marked on the map in red. The places we have under our charge are stated in the original award. The portions of channel or waterway of the Lower Bann river, immediately adjoining the several regulating weirs at Toome, Portora, Moyvaughan, and Carron. Those are under the charge of the drainage trustees.

3782. Mr. Barry.—Those were weir basins?—Yes; we have charge of two-and-a-half miles down there.

3783. Are those the portions below the weirs?—Those were adjoining the navigation channel. I am not really acquainted with this particular part of the work, but Mr. O'Neill, our engineer, is here. I do not know much about the engineering part of it.

3784. The Chairman.—Do I understand that you have the control of some weirs on the Lower Bann?—Only portions, two-and-a-half miles of the Lower Bann are under our charge; the rest of it is under the charge of the Lower Bann Navigation Trustees.

3785. But two-and-a-half miles above Coleraine, between Coleraine and Lough Neagh, are the portions you have charge of?—Between Coleraine and Lough Neagh, two-and-a-half miles; they are different parts

of the river, but there are two and a-half miles together we have charge of between Toome and Coleraine.

**Captain Green.**—That is so; there is a certain portion of the weir that are under the drainage trustees and not under the navigation. I may mention that Mr. Graham, who is our superintendent of all the work that has to be done, has now got the last drainage and maps that could not be got at in Coleraine.

**5786. The Chairman.**—Will you proceed with your evidence Mr. Otley?—Then I would call your attention to the Report of the Royal Commission on Navigation, in which, at page 12, you will find the following:—

"The evidence goes to show that in their present condition the works do not accomplish the drainage results which were expected from them, and which, in the first instance, they effected to some extent. Sufficient exertions do not appear to have been made to maintain them in the condition in which they were handed over by the Commissioners of Public Works."

Then, in 1884, Mr. Manning published a further report, and in it we find at pages 7 and 8:—

"Under the second head of my former report, I ventured to express my opinion that if works were executed to restore the channel of the river to the state in which it was when given up to the trustees, the same successful results would arise as in the twelve years from 1864 to 1893. After further inquiry into the subject I am still of the same opinion. From a survey, consisting of 283 transverse sections of the river, I have estimated that in order to restore the channel to the original capacity designed by Mr. MacMahon, a quantity of excavation amounting to 357,000 cubic yards will be required, and the cost at the rate of £23,400."

From the foregoing, the trustees came to the conclusion that the flood is chiefly caused by the present condition of the Lower Burn, but whether that condition is due to Mr. MacMahon's original plans not having been carried out in their entirety, or to the Lower Burn Navigation Trustees not having kept the river in a state in which they were bound to keep it, I cannot offer an opinion, because I do not know; but I would remark this, that Mr. Manning estimates the amount of excavation necessary to restore it to the capacity originally designed by Mr. MacMahon at 357,000 cubic yards. Mr. Barton estimates the amount of excavation to restore it to the condition in which it was handed over at only 68,248 cubic yards.

**5787. Mr. Barton** estimates 298,000 cubic yards!—Not to restore it to the condition in which it was handed over to them.

**5788. He says** necessary for the discharge of 385,000 cubic feet per minute!—It is at page 64 of Mr. Barton's Report.

**5789. Mr. Barry.**—I should like to draw your attention to the expression used by Mr. Manning. He does not say to restore the channel to its original condition, but to the original capacity designed!—Certainly, that is what I said. I submit that the proprietors who provided this money are entitled to have the channel restored to the original capacity designed, so that in what they subscribed their money for. It was on the faith of the plans drawn out by Mr. MacMahon that they agreed to taxation, and I submit in more equity they are entitled to have the channel put in the condition for which they paid.

**5790. The Chairman.**—Then from your remarks now, and from what took place when we were at Coleraine, I gather that that is the point in dispute between the Drainage Trustees and the Navigation Trustees!—The dispute is this, that we maintain the Lower Burn is not in a condition in which it ought to be, and that we are entitled to have it put in a proper condition.

**5791. Is that** admitted by the Navigation Trustees!—No, they do not admit that at all. They contend that the river is in the condition in which they got it. I think that was the evidence at Coleraine.

**5792. My question** was not quite that. The Drainage Board considered it necessary to have these works done to put the Lower Burn in a proper condition for the drainage!—Yes.

**5793. Without reference** to whether the conten-

tion of the Navigation Board is correct that the Burn is in the same condition that it was, and that they are not bound to do more. You agree with Mr. Manning and Mr. Barton that there is an amount of material to be dredged to put it in a proper condition for drainage!—Quite so. What we contend is, that the proprietors did not get what they paid for, and that it is not in the condition in which it ought to be, and that that is owing either to the original plan not being carried out, or to the Burn Navigation Trustees having neglected to keep the channel in the condition they were bound to do. Perhaps you will allow me to read the resolution that was passed by the trustees on the subject of Mr. Manning's report.

**5795. Probably** the last phrase may throw some light upon that point!

**Captain Green.**—I think they will explain the whole thing. There are the trustees and everything taken by Mr. Barton, to show the condition of the river when given over to the Navigation Trustees, and the removal of the siltings up that may be required to bring it back to the original state in which it was given up, but it was never given up according to the scheme of Mr. MacMahon.

**5795. Mr. Abernethy.**—I understood that Mr. MacMahon proposed considerable improvements in the river!—Yes.

**5796. And it was** upon the strength of those improvements that the money was subscribed!—Yes.

**5797. He estimates** it at 357,000 cubic yards to carry out those improvements!—That is Mr. Manning.

**5798. Mr. Barton** takes the river in the unimproved state at the time that they got it, and he says to restore it to that condition, without carrying out Mr. MacMahon's improvement, requires 48,000 cubic yards to be removed!—That is it.

**5799. Mr. Barry.**—Supposing that the original cost had been suggested by £25,400, would the trustees of the drainage have had to pay any higher rates!—No; they would have had to pay higher instalments in paying off the principal and interest.

**5800. Would not** they have had to pay rates on the additional money!—They would have had to pay a higher annual sum for paying it off, but I do not know whether the maintenance rates would be higher.

**5801. I am not** talking of the maintenance rate!—Naturally they would have had to pay more. The principal and interest were paid back in twenty-two half-yearly instalments, and naturally, if the extra £25,000 had been expended, they would have had to pay that extra.

**5802. Assuming** that the works were handed over to the Drainage Trustees in a state that would have required a further expenditure of £35,400 to have realised Mr. MacMahon's design, the capital cost of the works would have been swelled by that amount!—Certainly it would.

**5803. Who executed** the works!—It was carried out under the superintendence of the Board of Works. I think it was Mr. Otley.

**Captain Green.**—Mr. Otley had charge of the Lower Burn works.

**The Witness.**—I would submit to you we are entitled to have the river put in the condition that it would now be put in with an expenditure of £35,000 for the money we paid.

**5804. Mr. Barry.**—That is what you contend!—Yes; we agreed to pay the money on the condition that we got certain things.

**5805. The Chairman.**—Have you any plans to show the condition of the river upon which you paid a certain sum of money!—I have not.

**Captain Green.**—The nearest approach to that are these plans that are here now.

**The Witness.**—They would be with the trustees of the Lower Burn Navigation, because they had charge of the river.

**5806. The Chairman.**—Surely before you paid your money you ascertained what you were paying for!—Those plans would be with the Board of Works, I

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should think. The plans were all lodged, and objections were taken to them, but we have not got those plans.

3807. What objections were taken to them?—Any objections that were urged were considered. At pages 53 and 54 of the report you will find a statement about the original carrying out of this work, and at the top of page 54 it says—"At those meetings which were held on the 23rd and 25th of June following, and which were numerously attended, the subject of the proposed measures appears to have been fully explained and discussed, and shortly afterwards the assent of the proprietors of a majority of acres considerably in extent (6,000) of that required by law were received." Then he goes on further down and says—"The works of the district have been carried out, with some important alterations in local arrangement, in entire accordance with the principles and general design laid down in Mr. MacMahon's report, and their anticipated effects have been realised to the fullest extent."

3808. Mr. Barry.—I gather you would contend, whatever was the cost of making Mr. MacMahon's design, if you paid the money that was put down as the charge that would be made against the drainage trustees, you were entitled to get Mr. MacMahon's design whatever it would cost?—I think so.

3809. I only wanted to see what the contention was?—That is our contention.

3810. The Chairman.—What money did you pay?—The proprietors paid £110,000.

3811. Mr. Abernethy.—On what works was that money expended?—On these maintenance works. The proprietors paid £110,000; £8,513 was paid by the counties of Antrim and Down for certain country work; and £39,309 was a free grant.

3812. Did that sum include the works at the entrance?—That included all the works at the entrance to the lake.

3813. The Chairman.—Surely there ought to be some plans to show the state of the river when you paid the £110,000?—We have none.

3814. Mr. Abernethy.—Are there no plans which show the improvements which Mr. MacMahon designed on the river?—We have no maps bearing on that subject, I am afraid; but with reference to that our engineer would be able to give you much more information than I can, because he has been acquainted with the drainage ever since the commencement. I have only lately come into office, and I can only give you the views of the trustees on the subject.

3815. Mr. Barry.—Did not Mr. James Barton inspect the works and make a report on the subject on March 10th, 1859?—Yes, I find he did make an inspection.

3816. Was Mr. James Barton employed by the trustees of the Lower Bann Navigation?—Yes.

3817. Was any engineer employed by the trustees of the drainage to inspect the works?—No, I think not, and I never heard of it.

3818. The Chairman.—I must call the attention of the representatives of both bodies to this, that in Mr. Manning's report, on page 7, he says—"Under the second head of my former report I ventured to express my opinion that if works were executed to restore the channel of the river to the state in which it was given up to the trustees the same successful results would arise as in the twelve years from 1854 to 1866." Then he says—"The channel of the Lower Bann should be restored to the capacity designed by Mr. MacMahon." Now if the river was successful for the twelve years between 1854 and 1866, how is it that it is not so now? Does not that conclusively show that there has been neglect in keeping the river in the condition in which it was in when it was handed over to the trustees?—That is for you, gentlemen, to consider. That is the view our Board take of the case.

3819. The Chairman (to Captain Givens).—Without reference to any plan, was there any objection raised to this part of Mr. Manning's report?

Captain Givens.—I cannot say myself. May I ask what year Mr. Manning's report was made?

The Chairman.—The report I have been reading from is dated the 18th March, 1861, and it is from this report I think it is quite clear that for twelve years the river was in the proper state, and that since 1866 it has been allowed to get in the condition that is now complained of.

Captain Givens.—I think you will find that Mr. Barton's plans, which are all here now, will explain the position of the river when he took those plans and sections.

3819. The Chairman.—When was that?

Captain Givens.—In 1881. They will show the real bottom of the river that has never been dug out or moved at all. Even in the navigation channel, although it is supposed to have been given over at a certain depth by the Board of Works to the trustees, Mr. Barton's survey will show, I think, in these plans what is solid ground and what is silted ground.

The Chairman.—I think you will have to meet this statement in Mr. Manning's report. Have you objected to the wording of this report?

Captain Givens.—I cannot say that I have. We have relied altogether on Mr. Barton's report, and have never taken any notice of Mr. Manning's report, as far as I understand it.

3820. The Chairman.—It appears to me most conclusively, from this statement, that the trustees have not kept the river up since 1866 in the state that they did between 1854 and 1866?—With regard to that it seems it was only in 1880 that the Lower Bann Navigation Trustees admitted they were liable for the maintenance of the entire river. Up to that time they had denied that.

3821. Mr. Barry.—Will you state under what circumstances that dispute arose and the admission was made?—I quote from a letter of the secretary to Mr. Barton, dated the 3rd September, 1880, in which he says—"Beside the navigation works proper, the trustees are advised that they are bound to restore the river to the state in which they received it from the Board of Works." Thereupon followed Mr. Barton's report, as to the state of the river, which is dated the 30th July, 1881; and if you turn to page 65 you will see an extract there from Mr. Crookshank's letter, and from that it would seem that it was only at that date that the Lower Bann Navigation were aware of the fact that they were liable for the maintenance of the entire river. Mr. Barton's report then follows.

3822. Mr. Abernethy.—It is very true they admit the liability, but they say they are advised they are bound to restore the river to the state in which they received it?—But it is only in 1880 they admit it.

3823. The Chairman.—Still it is an admission?—But up to then they evidently had not admitted it, and what we contend is that during all those years the river was allowed to silt up.

Mr. Barry.—Had they entirely denied their liability up to the year 1880?—I cannot say that they did exactly, but there had been a good deal of correspondence with our board previously to that date, urging them to adopt adequate measures to restore the Lower Bann to the improved condition in which it was handed over to them. Our late secretary, Mr. Hancock, states in a pamphlet that they did deny it.

Captain Givens.—I think it would be as well to explain at once that we, as trustees, did not consider ourselves at first bound to levy money for any other purposes than navigation purposes; that was the understanding of the trustees formerly. They then took counsel's opinion upon that interpretation of the report.

The Chairman.—That is what you stated in Coleraine, if I remember rightly, but that does not touch this point.

Captain Givens.—I thought you were asking whether we ever denied our liability.

The Chairman.—I think you mentioned in your evidence at Coleraine that you had taken counsel's

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opinion, and had been advised you were bound to keep up the river?

Captain Given.—Yes.

Mr. Pien.—But up to that time you were under the belief that you were not bound?

Captain Given.—We were under the belief that we had no right to levy or spend money for anything but navigation purposes, and that the drainage belonged to the drainage board.

Colonel Leslie.—That we were simply bound to keep the navigation channel.

3825. Mr. Abernethy.—It was handed back in 1859?

—Yes.  
3826. Mr. Crookshank's letter says:—"Beside the navigation works proper, the trustees are advised that they are bound to restore the river to the state in which they received it from the Board of Works." That was in 1859. Then Mr. Barton goes on to say:—"My inquiry, therefore, has been directed to ascertain when was the sections of the navigation channel throughout, and what the sections of the remainder of the river channel in 1859, and what they are now." Have you any sections to show the condition in 1859?

—No.  
Captain Given.—We never could get hold of any plans that were any guide to us.

Mr. Abernethy.—Have you got any sections?

Mr. Crookshank.—They were taken by Mr. Barton in 1881.

Mr. Abernethy.—This paragraph would lead one to infer that Mr. Barton took sections with a view to compare with what the river was in 1850, but there do not seem to be any sections in 1859 with which you could draw the comparison?

Mr. Crookshank.—I understand the Board of Works have no section here. That is what Mr. Barton told me.

Mr. Abernethy.—I think that is correct.

Mr. Crookshank.—The whole thing is a mystery as far as the sectional area of the river is concerned on being handed over to the trustees.

The Witness.—From 1859 to 1881 the board of the Lower Bann Navigation took no notice of anything but the navigation channel, and that is what our board complained of, that they were damned up in consequence of the condition of the Lower Bann.

Captain Given.—That is all removed now.

3827. The Chairman.—Perhaps, Mr. O'Neil, you had better conclude your statement now?—I do not think I have anything more to say. I have simply laid the view of the trustees before you, which is simply that the floods are caused by the state of the Lower Bann, and that they are entitled to have the river restored to the state originally designed by Mr. MacMahon, that being what they paid their money for.

3828. Mr. Pien.—Are the floods worse of recent years than they were ten years ago?—I think that the largest flood we had was about 1877, and we have had no such floods since. I do not know that they are much worse, but they take longer subsiding.

3829. You talk about having the condition of the Lower Bann restored to what it was originally, if it has been injured as you say by their neglect, and by the silting up of the bed of the river, it ought to show increased floods from year to year?—The flooding this year certainly has been exceptionally heavy. In 1877 there was an exceptional flood, and the heaviest flood we have ever experienced, I think. This year, at present the country is very much flooded, but on that head Mr. O'Neil could give you much better evidence than I could.

3830. Mr. Barry.—Will you tell me what the total outlay on the district was for the navigation and everything else?—The total cost for drainage and navigation was £254,167 4s. 11d.

3831. The Chairman.—Then there were certain sums repaid by the counties?—Yes; certain sums were repaid by the counties.

3832. Leaving a nett balance of £245,205?—

£28,513 was repaid by the counties Antrim and Down, and £110,000 was paid by the proprietors—that is for the drainage works.

3833. Mr. Barry.—If you will refer to page 55 you will see the total expenditure was £254,167, and then certain sums were repaid by the counties, and by a proprietor?—Yes.

3834. Leaving £245,205 to be divided between the drainage and the navigation?—Yes.

3835. Of which the drainage paid £144,214, and the navigation £101,081?—Yes.

3836. Then it goes on "Of the excess above the original estimate, amounting to £38,453, about £50,000 is due to interest, accruing during the extended time the works have been in hand, beyond what had been provided under that head. For the difference (£38,453) there appears to be a sufficient explanation in the greatly enhanced value of labour and materials since the original estimate was framed in the expenditure on works submitted in that estimate to be provided for, but which has since been found necessary, and in the maintenance of the finished portions of the works during the progress of the remainder. In regard to the amount to be charged to the proprietors in respect of the improvement of their lands, consequent on the drainage, we are of opinion, under all the circumstances of the case, as already adverted to—viz, the amount of original estimate on which the proprietors assented to the undertaking, the expenditure, the extent of excess, and the anticipated and realized benefits, that it should be limited to £110,000?—That is the sum the proprietors paid.

3837. And they have paid, I suppose, since the date of this award the rates to pay interest, and for a sinking fund on £110,000?—That has all been paid off. I think it was paid off in 1881, if I remember rightly; and then in addition to that, they have spent a great deal of money on the maintenance of the works.

3838. But I suppose that the maintenance of the works was one of their duties?—Certainly; it comes out of the pockets of the proprietors. On an average they have spent about £1,300 a year on the maintenance of the works.

3839. Then I suppose you would contend that if the total cost had been increased by any sum necessary to do further extensions than were absolutely executed at the time of the completion of the works, that sum would have been remitted?—I think so; that is my view.

3840. Are you quite certain that the drainage trustees took over the river from the Board of Works without making any survey—that is to say, the portion of the river for which they had to pay £110,000?—We only have two and a half miles of that river under our charge.

3841. But you paid towards the works of the whole river?—Yes.

3842. You were to pay £110,000 originally?—That was for the drainage works, but we looked on the Lower Bann as the navigation works with which we had little or nothing to do.

3843. Still you drainage you had to pay £110,000?—Certainly.

3844. Are you certain that no survey, or levels, or sections were taken by the drainage trustees?—I am not aware of any ever having been taken.

3845. As far as you know none were taken?—No; in fact we have nothing to do with the river except on that small portion.

3846. That is a matter of argument, whether you have anything to do with the river; but, as a matter of fact, you think none was taken?—None were taken. The works under our charge were all detailed in the final award.

3847. Mr. Abernethy.—In Mr. MacMahon's report, which is dated 1845, at page 28, he recapitulates certain works as necessary?—Yes.

3848. Then in 1859 they take over the river?—Yes.

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3848. Is there anything to show what the condition of the river was in 1853, when you took it over?—We have nothing to show.

3849. Mr. Pim.—You say the sum of £39,000 was

remitted. Was that remitted wholly in relation to the drainage charge, and not in relation to the navigation?—Yes; so I understand.

Mr. William James O'Neill examined.

Mr. William  
James O'Neill.

3851. The Chairman.—You are the engineer of the Lough Neagh drainage district?—Yes.

3852. You are familiar, I believe, with all this negotiation and the charges that have been made from time to time about the condition of the river Ban?—I am.

3853. Are you in possession of any plan, or do you know what state the river was in when it was finally arranged for £110,000, to be paid by the drainage trustees?—No; I have not. The drainage trustees looked upon the river as belonging to the Lower Bann navigation trust, and consequently they took no interest in it.

3854. There is a report from Mr. Manning in which he states that for twelve years—from 1854 to 1856—the state of the river was satisfactory for drainage purposes?—Yes, I am aware of that.

3855. Then it states that if the river had been continued in that satisfactory state during subsequent years none of these complaints would have arisen. That is the tenor of his report. Do you know what state the river was in during those twelve years and what its subsequent condition has been?—No; I have no means of knowing what state it was in. The first time I took cross sections was in 1877.

3856. Mr. Barry.—When did you first begin to be connected with the Lower Bann navigation?—In 1859, when the trustees were first appointed.

3857. Mr. Abernethy.—When they took it over?—Yes.

3858. Have you anything to show the condition of the river at that time?—I do not know anything of the condition of the Lower Bann at that time. We were principally occupied with the arterial drainage.

3859. The Chairman.—Surely if you paid £110,000 on certain conditions, was not it the duty of the trustees to see that those conditions were complied with?—I am not aware that there was any provision for anything of the kind. I never heard of it.

3860. You for twelve years the river continues satisfactory, and then it gradually gets worse until it is in the state we have heard so much of?—There certainly was not the flooding during those twelve years that has taken place since.

3861. Of your own knowledge do you know whether the river is in the same condition as it was when you took charge in 1859?—I observe in a great many places there is a great deal of silting up even where there is a good river and perhaps forty or fifty feet of muck along the borders, that I believe was once river, conveying the drainage. I notice that some of the farmers have pushed their fences out perhaps forty or fifty feet taking in a little bit of intake of the borders of the river. That is the only thing I have noticed.

3862. Perhaps that is sufficient to account for the whole?—I observe that in Mr. MacMahon's section he divides the reaches of the river into muddy longles, some of them having a fall, where the river was very deep, of only three inches to a mile, or possibly two inches to a mile, and that for a very considerable length; and then there are short reaches again, where the river is improved, that would be six inches to a mile.

3863. Mr. Abernethy.—Where is that section?—I will produce it.

The Chairman.—Is it the fact that houses have actually been built upon land that has been taken in from the river since Mr. MacMahon's survey and report?

Captain Oliver.—There is the lock house at Carruce which is built upon stuff which was taken out of the river.

Mr. Pim.—The question is, have people in the locality exceeded upon what was originally theirs and put buildings on what they have taken in?

Captain Oliver.—I think not.

Mr. Croker.—Where the land was reclaimed. As some places at Toome there are houses built on the land reclaimed at the time the works were finished.

The Witness.—This is Mr. MacMahon's preliminary report. He was the engineer to the Board of Works. It is dated 1845, and the title page is "Lough Neagh District. Report to the Commissioners appointed under the provisions of the above Act, on the drainage of the flooded lands and the improvement of the navigations in the above district, by John MacMahon, Vice-President of the Institute of Civil Engineers of Ireland, together with a report on the valuation of the flooded and injured lands in the districts, by B. Harding."

3864. Mr. Abernethy.—Turn to page 25 of the Blue Book. Mr. MacMahon recommended three certain works. He gives them as "First," "Secondly," "Thirdly," "Fourth," and "Fifth." What portions of those works were done between 1845, the period of his report, and 1859 when the river was taken over?—I have no knowledge of the facts. I was not in this country at the time. I was abroad at the time the Board of Works were carrying out those works.

3865. What portions were carried out between 1845 and 1859?—I think I have a pretty accurate idea generally. The several shallows on the Lower Bann were excavated, and there were very extensive arterial works through the county Armagh so as to connect the flooded lands in county Armagh with all the improved outfall.

3866. The Chairman.—Was that before 1859?—Yes; these works that I speak of now were completed about 1859.

3867. Mr. Abernethy.—Have you anything to show what those works were definitely?—Yes.

3868. Mr. Pim.—What you are showing us here now is Mr. MacMahon's preliminary report before the works were undertaken by the Board of Works?—Quite so.

3869. Are there in existence copies or the original plans from which the works were executed?—Not that I am aware of.

3870. The Chairman.—Have you any plans showing the work as executed upon Mr. MacMahon's report?—There is a schedule of the works, but I have no plans or sections.

3871. Referring to page 23 and the five headings of the proposed works, were those works carried out? Take the first—"I propose removing the present fishing cribs, and their separating pier, the agency house and offices, the old kiln, and as much of the ruins of the old mill as lie between the wheel race and the river." Was that work done?—I am able to say, comparing the plan in this report with what it is at present, that that work was carried out, although I have no personal knowledge of it.

3872. Then that disposed of the first. Then "Secondly: To cut down the rock, or as much of it as may be required in the site of the proposed new cuts or fishing passages, and of the regulating weir, to eight feet above datum." Was that carried out?—That was carried out.

3873. Mr. Abernethy.—Before 1859?—Yes, before 1859.

3874. The Chairman.—Then "Thirdly: To reconstruct the free gap, or Queen's share, in the same site as the present one now occupies, with four new ribs extending from it, towards the western or Derry

bank of the river, and accessible from that side by a proper gangway; also, to erect two regulating weirs obliquely positioned, and extending from those crabs on each side towards the shore, that on the east side 150 feet in length, and that on the west 350 feet. The level of the coping of those weirs, to be at or near the level of low summer water, so that all or nearly all the water, may then pass through the crabs and free the gage." Was that done?—That was carried out.

3875. Then "Fourth: To excavate a channel, for the navigation on the east side of the river, as close into the land as practicable, and in it to build a lock for passing the trade from one level to the other." Was that carried out?—That was done, except

Mr. Robert Manning called in, and further examined.

3876. The Chairman.—As you are probably aware there is a dispute between the trustees of the Lough Neagh Drainage and the trustees of the Lower Bann Navigation, as to whose duty it is to put the Lower Bann in a proper state for drainage purposes, and there is a difficulty in ascertaining the condition that the river was in, in 1850, when the drainage trustees paid the sum of £110,000 for a certain state of things. In your report you say that for twelve years, from 1844 to 1856, the river was properly maintained and worked satisfactorily, but since then it has not been so, and you recommend that certain things should be done to restore the river to the condition it was in when handed over. The Lower Bann navigation trustees said that they had nothing whatever to do with the river except for navigation purposes. Then they took counsel's opinion and found that they were responsible for keeping the river in proper order. As you state now it will cost £25,000 to put it in repair. We can only assume from all these papers that it was in proper order in 1850, and it is not in proper order now. Perhaps you can throw some light upon it?—With reference to that, I may say, it was long before my time. Although engaged with the Board of Works at the time as an engineer, I had nothing whatever to say to the navigation of Lough Neagh, but I have a general knowledge that at the time there were several meetings held and I presume the parties interested, either in the navigation or in the drainage, were there represented. Certainly they had the power of being there and they had the power to object to the award, and as far as I know the works were substantially carried out as far as I could see from the plans and from statements according to Mr. MacMahon's design. The only exception that I could see to that—and I examined the whole river myself and took sections, and also afterwards got Mr. O'Neill to take accurate sections—was at the upper side of Portna weir, which is in rock cutting and there certainly appeared to me to be something there. We all know if you excavate a large river channel, we put what are called splitting dams down it and at the side of those dams they had no means of getting out the rock after destroying it there. I cannot state that as a fact; but I know in some places about Portna that I referred to in my report, in my opinion, in that regard the works were not carried out to the full extent.

3877. Mr. Abernethy.—What I have been trying to get at is this. Mr. MacMahon made his report in 1845, and we have asked Mr. O'Neill as to whether the various works recommended in Mr. MacMahon's report, which are in five heads, were carried out. We have read those heads to him one by one, and he says they were all carried out. Therefore, we want to know what was the actual condition of the works when handed over in 1850, because in your report you say that the channel of the river Bann should be restored to the capacity originally designed by Mr. MacMahon. That is at page 9, and in the first recommendation you make?—Yes; that is the recommen-

that it is on the western side and not the eastern side.

3876. Is that a mistake?—No, they changed their plans. They found it was better to put it on the other side. They had some reason for doing so, I suppose.

3877. Then "Fifth: To remove the island which stands upstream of the Cutts, and a portion of the garden on the west side opposite to it; and excavate the rock in the upper weir basin to a sufficient depth, to allow the water to come forward to the discharging line of the weirs, without obstruction calculated to impede its motion, or raise a head prejudicial to drainage, during the presence of the floods." Was that work carried out?—That was done.

dation that it should be restored to the capacity which it has lost. That is assuming, as I think I had the right to assume, that the works were finished according to Mr. MacMahon's design.

3880. That that special work which you referred to now had been finished. You say, with one exception, it was carried out you think?—Yes; as a matter of fact, I know that the channel of the Bann in several places could not have been, when I visited it, in the condition that Mr. MacMahon left it, or rather in the condition in which the engineer, who constructed Mr. MacMahon's works, left it.

3881. The Chairman.—That was before that report?—That was when I made the preliminary report, which was the first time I saw the River Bann professionally—that was in 1877.

3882. The report Mr. Abernethy is sending from refers to that former report of yours?—Yes, and that was made on June 8th, 1877.

3883. Mr. Abernethy.—You give the causes in 1877, and then you recommend definite works in 1884?—Yes.

3884. Then you say that the channel of the Lower Bann was not restored to the capacity designed by Mr. MacMahon in 1850, and that the works recommended by him were not carried out. Mr. O'Neill has said that all the works enumerated in Mr. MacMahon's report were carried out?—That is my belief, with the exception I have just mentioned.

3885. That is the first exception?—The exception is probably the seat of a splitting dam being left in at Portna, and it may be in other parts of the river, but substantially it is my belief they were carried out.

3886. Then the second heading of your report is—"The discharge of the weirs at Tormac, Portna, and the Cutts, should be rendered more effective by the construction of powerful sluices in each of them." That was no part of Mr. MacMahon's report?—No.

3887. Then the third—"Additional excavations should be made at Loughlin Island, and the lower parts of the Macosquin, Abadower, and Aggrey tributaries should be improved and embanked." That is also no part of Mr. MacMahon's report?—I cannot tell that without looking at the sections. It was no part of his scheme to embank those parts.

3888. Then, fourth—"In order to moderate the effects of such a flood as that of 1877, and of other exceptional floods of less volume in a great degree, additional excavation in rock should be made above Portna weir, so as to render the increased power of discharge by the sluices more effective?—Yes; and that observation indicates any little thing left by Mr. MacMahon, or I suppose was left, but additional excavation, more than he contemplated. I was going to observe, that to my knowledge, there must have been an accretion, which has taken place in the bed of the Bann river after the works were given up. It was very obvious, for a very large quantity of silt was taken from below Tormac weir, and if you look at Mr. MacMahon's report, you will find the story told there of ages ago, when a man had built a house upon the edge of the flood and he was obliged to raise it up a

Jan. 22, 1887.

Mr. William James O'Neill.

Mr. Robert Manning.

Dec. 15, 1877.

Mr. Robert  
Manning.

few feet; then he built it a third time, and said it was no use changing his residence any more, because if he went on to the top of the mountain the Bann would follow him. That is the best evidence you can find—a long time ago—that there was a tendency to bring down silt and sand through that lake, which has rather astonished me. It comes from a tributary entering into the lake, which sends down a quantity of sand, and that is sent by the current down to Toome weir, and discharged over it.

1889. These shoals which had formed in the river between 1859, when the river was taken over, and 1884, the date of your report, were shoals created during that period, and which ought to be removed, to restore the river to the condition it was in 1859.—It was not in that condition in the year 1877, represented by Mr. MacMahon, and the assertion in my opinion, must have taken place between the time of these works being completed and 1877.

1890. Mr. Barry.—When do you say the works were completed?—They were reported as complete on July 29, 1858, except the dredging through Lough Beg, which was not finished until May 30, 1861.

1892. The date of the award is 1858.—Yes, and made final in 1859.

1893. I think that will require some attention for the reasons I am going to refer to now. Do you know Mr. Barton's report of 1859?—Yes, I have read it.

1894. In Mr. Barton's report he states that the works were not completed in several particulars which are mentioned at page 581.—I am not so well up to this, because this is before my time, but Mr. O'Neill tells me now what I know to be a fact, that the assistant engineer of the Board, in consequence of complaint, went down to Lough Neagh and did the work complained of. In the appendix to my report (p. 57), the whole matter is fully explained.

1895. Who was the engineer to the Board?—Mr. Baylen was the assistant engineer.

1896. Mr. Ottey was the chief engineer, I think?—He was what we used to call at that time district engineer, and he having finished his work, Mr. O'Neill was sent down from the Board of Works to execute these works complained of.

1897. However that may be, Mr. Barton states in 1859 that the works were in certain respects incomplete.—That was after the date of the award. As I tell you, after that there were more works done, and my memory of Mr. Barton's report is this—very great praise of the works.

1898. I think Mr. Barton praises them generally at the end of his report, but still he does undoubtedly draw attention to the fact that, for certain causes the works were not complete in 1859, and the date of the award is 1858.—There is a long correspondence at the end of this, and I will read it over carefully to see the actual facts. I cannot charge my memory.

1899. Then if you are going to do that, would you also give attention to Mr. Barton's report of July 30th, 1861, at page 63. He states there that he submits seventy-one sheets of tracings of the drawings which are in the office of the Board of Works, containing 423 sections of the river. Then he goes on to say:—

"I did not consider it necessary for this report to make nearly so many new sections of the river as these. I have made, however, fourteen sheets of sections, showing 126 cross sections of the river and a longitudinal section, and submit them herewith."

He then goes into detail of the amount of excavation which he considers the trustees of the navigation are responsible to remove; "and where this differs from the red lines I show it by a black dotted line." Then he estimates that the total quantity to be excavated was 19,532 cubic yards, and he estimates the cost at £2,579. Then he sums up his report and says:—

"The facts in short being that—1st, Mr. MacMahon did not propose to provide sufficiently for the floods; 2nd, That the working drawings did not provide as large channels as Mr. MacMahon contemplated; 3rd, That the work as done

was in many cases short of the work shown on the working drawings, and 4th: That considering his close association to the extent I have shown which can be removed at the cost named in my estimate."

—I am under a great disadvantage in replying to that, because I have not got the slightest knowledge of it, and I merely—casually in the years 1877 and 1884—went there to ascertain facts; but I perfectly remember that in the discussion of that very report Mr. Barton gets his quantities upon the probability of such a portion of the river being too small in section from accretions after the works, and others that in his opinion must have been there and were not the result of accretions after the works. That is a matter of opinion and judgment which he may be right in or wrong.

1900. Mr. Abernethy.—I think the statement is now that working drawings show certain channels not carried out, but if you refer to the report of Mr. Barton, of 1861, he says:—

"My inquiry therefore has been directed to ascertain what were the sections of the navigation channel throughout, and what the sections of the remainder of the river channel in 1859, and what they are now."

Then further on on the same page he says:—

"I have shown two lines in blue on each of these cross sections—the low water summer level and the level at which Mr. MacMahon in his report stated that the sections of floods would run according to his calculations, the calculations he made of the size of the channels to be provided under those flood levels have been referred to both by Mr. Manning and Mr. O'Neill in their examination into this question, and hence I have deemed it necessary to ascertain for you whether the channels stated by Mr. MacMahon to be necessary, were provided by the drawings prepared for carrying out the works, and I find that in many cases they were not. In many places the channels shown are not nearly as large upon the working drawings as those given in Mr. MacMahon's report. And, then again, the channels as carried out were often still smaller than those given in Mr. MacMahon's report."

—I will direct my attention to that.

1901. The Chairman. The solving of this difficulty really depends on the finding of those plans alluded to as being at the Board of Works.—The difficulty in all these cases is, after a work has been finished for a number of years, to hypothesize on what has occurred when you do not know how actual facts. I took very great care, as I will show you, in ascertaining the fact, and the quantity of water the results of which I have given in my report; but, as a matter of certain fact, between the time that I examined the river in 1877 and during the time I had anything to say to it, I knew accurately the quantity of water that was going over Toome Weir. I applied that to another gauge down the river, and I found that at the same height it was discharging a less quantity of water—that is, that at the same height of water in the lake, there was a less quantity of water discharged by the river below—showing me clearly that there was an insufficiency of channel which occurred between those two observations.

1902. Mr. Abernethy.—I should have followed this a little further. At the bottom of page 63 he says:—

"And then again the channels as carried out were often still smaller than those shown on the working drawings; how you responsibility is, I estimate, to be measured not by the channels proposed in Mr. MacMahon's report, but by the channels as far as they were completed in 1859, when the award was made. Upon the sections annexed you will perceive by comparing them that the present channels are in many cases larger than those proposed by the Board of Works, and where smaller you will see that evidently in many cases there was a departure from the original drawing, the banks in many cases having been raised of stone at a width less than that shown on the original drawings; and in other cases large stanks—that is what you were referring to a short time ago—" put in for the construction of the Works have been left behind; and are now seen on the cross sections manifestly hindering the flow of the river. The result of these insufficient channels has been to raise the flood level."



—I will apply myself to that when I read over this carefully. Then, probably as the members of the Commission may see the river before I am examined again, I may direct your particular attention to Portglenone bridge. That is a point I would ask you to look at, and to see the section of that bridge, as carried out after Mr. MacMahon's design, and I will put it to you whether that is not the regulator of Lough Neagh substantially.

3903. The Chairman.—When was that bridge erected?—As part of the works designed by Mr. MacMahon.

3904. After Mr. MacMahon left?—No; Mr. MacMahon never executed the works—he was the designer of the works which Mr. Otteley carried out after his design.

3905. Mr. Abernethy.—Do you think these plans referred to here in Mr. Barton's report can be obtained?—Certainly; we can give them to you, every one of them. He says he has inspected the Board of Works plans. I can give you those plans, and the plans made after the completion of the works, but I do not think we have cross sections after the completion of the works.

3906. Have you any cross sections which will enable us to compare the condition of the river when handed over in 1869, and subsequently?—I have so-called cross sections—I think 109 of them—prepared by me to find the actual condition of the river, in the year 1883, and here they are.

3907. We have been trying to institute a comparison between the cross sections of 1839 and subsequently?—I have cross sections of the proposed design of Mr. MacMahon, but whether fresh cross sections were made to verify, whether that design was carried out to the letter, I cannot now state. If we have them I will have them prepared for you.

3908. Mr. Pitt.—Were the works actually carried out by the Board of Works, or by a contractor under it?—They were carried out by day work.

3909. Were these plans that Mr. Barton refers to Mr. Otteley's working plans—that he was presumed to work to?—Yes; they were the plans which guided him in the execution of the work.

3910. Mr. Barry.—Who prepared the working drawings?—I do not know at all. I was District Engineer in another part of the country. There were seventeen of us in different parts of the country, and Mr. Otteley was one. The course adopted in my office was this:—Supposing a work—as most works in my charge were—was carried out by day labour, the original sections were sent down to my office, and I got detailed drawings made for the purpose of enabling me to carry out the work whenever it was necessary. These were not, so to speak, official documents. It was just this—that if you or I were carrying out a work, and saw any difficulty in any part of it, or any necessity for it, we should order detailed surveys to be made of that particular part.

3911. Would it be within Mr. Otteley's power to alter Mr. MacMahon's design?—No; except with the authority of the Board.

3912. Then you would have a record of that, I suppose, at the office?—I do not mean to say there was any difference, but if there was I think I may be able to give you some information about it, and find it out.

3913. With reference to Portglenone bridge—was that erected from the designs of Mr. MacMahon?—I

cannot state, but I think so. I do not think in that report of Mr. MacMahon he would go into details of the work as if he were going to make a contract for it, but he would give generally the quantity of water, the section, and the necessity for building a new bridge at a certain level, but all these matters, I think, would be prepared afterwards in detail.

3914. Would he state what waterway should be given to that?—That would follow from the quantity of water he proposed to discharge at a certain level.

3915. But I thought I understood you to say that Portglenone bridge had been built in such a way as to obstruct the flow of the water?—No; what I mean to say is this—with reference to those obstructions that are talked of now in the lower part of the river. We will take Portna for example. Suppose the whole weir of Portna were taken out bodily, in my opinion—in consequence of the section of Portglenone bridge, which I believe in the section which Mr. MacMahon designed or intended—it would not lower the level of Lough Neagh, or any part of the surface of the water above Portglenone bridge by a quarter of an inch.

3916. Mr. Abernethy.—The waterway of the bridge, in fact, being the gauge?—Yes; the gauge.

3917. Mr. Barry.—You do not allude to Portglenone bridge in your report as one of the necessary works?—If you look at my report of 1884, perhaps I do.

3918. My reason for asking is that the expense would have to be added to your estimate?—We are speaking now upon the abstract question as to the effect the shoals that were either left in the river, or accumulated down to Portna, or somewhere lower, and I say, however that may be, the section of Portglenone bridge is the regulator that determines it.

3919. What I was alluding to is this, that you say that certain works under five heads are necessary to enable the Lower Bann to discharge and moderate the effects of such a flood as 1817?—Yes.

3920. And you state that these works would cost £35,000?—Yes.

3921. But I gather it would be necessary to incur the expense of reconstructing Portglenone Bridge?—Not at all. I forget now whether Portglenone is on rock or not, but nobody would think of taking down a grand bridge there. I would merely deepen the channel there if necessary.

3922. And that would be included in the £35,000?—I think so.

The witness withdrew.

3923. The Chairman (to Captain Gliven).—There are one or two questions I should like to ask you. As you are aware, there are certain works recommended by Mr. Barton to be carried out. Have these been carried out?

Captain Gliven.—I cannot say what they are unless I read them, but we have been at work ever since Mr. Barton's report, with the designers in removing the silt, and also in taking away many of these stanks that were left originally by the Board of Works. I am right in that, I think.

Mr. Graham.—Yes.

Captain Gliven.—Between Lough Neagh and Toome Railway bridge is the drainage, and we have expended £2,500 in draining that. From the railway bridge to the road bridge has been dredged by us at Toome.

Mr. Graham.—Yes, that is so.

Jan. 29, 1887.  
Mr. Robert  
Manning.

*Mr. David Graham further examined.*

Jan. 12, 1855.

Mr. David  
Graham.

3924. *Mr. Abernethy.*—Just take Mr. Barton's report at page 64. He says he gives an estimate of works, and he says, "The first column shows quantity to restore navigation channel to original state as in 1839; second column shows quantity to restore the remainder of the river channel to the same state." Then he gives his estimate—"Lough Neagh to Toome Railway Bridge, 2,269 cubic yards." Has that been carried out?—Yes.

3925. Then "Railway bridge to road bridge, 4,552 cubic yards!—That is done.

3926. Then road bridge to Lough Beg, 851 cubic yards?—Yes.

3927. Lough Beg, 53,477 cubic yards!—Yes—a great deal more than that, and I made a calculation of it.

3928. Then Portlengnane and Clement's Ford, 5,444 cubic yards!—Yes, that has been done.

3929. Portora, 2,296 cubic yards!—Yes, that has been done.

3930. Killybeg, 111 cubic yards!—Yes.

3931. Making a total of 68,610 cubic yards!—Yes, that is done.

3932. You say you have done all these?—I have done more in Lough Beg. I have not altogether finished Lough Beg yet.

3933. Tell us what you have done in Lough Beg?—I could not exactly tell you, but at the time that Mr. Barton made that report I made a calculation myself, and I found I was somewhere about 48,000 yards; that is 10,000 cubic yards difference.

3934. Then the next is—"For navigation details of dredging necessary to restore the navigation channel to its full original section, from Lough Neagh to the Outlet." Then the quantities are given. There are altogether 5,400, 17,300, 21,600, and 27,600, making altogether 117,500 cubic feet at the railway bridge. Has that been done?—Yes, and the 4,000 yards.

3935. That is at the county road bridge?—Yes.

3936. Then there are 250 yards?—That is done.

3937. 411 cubic yards at Broomart?—Yes. Then Lough Beg is done, but I estimate 48,000 cubic yards. I have 5,000 cubic yards to do yet, but I have done 43,000.

3938. Then 5,444 and 2,296 at Portlengnane and Portora together?—Yes.

3939. And 111 cubic yards at Killybeg?—Yes.

3940. That is 48,610 cubic yards. You say you have done more than that?—Yes.

3941. The *Chairman.*—Does not it follow, although you may have taken all that out since this report was made, that it is constantly accumulating, and requires constant dredging?—It does.

3942. So that these figures do not represent the work you ought to have done or properly done?—They are the accumulations which are always gathering.

3943. *Mr. Abernethy.*—They do not represent the quantity of work you ought to have done to keep the navigation in the condition in which it was in 1839, when it was handed over?—I cannot say anything about that.

3944. You cannot tell us what it was in 1839?—No, I was not there in 1839.

3945. *Mr. Barry.*—Can you tell us whether the sectional areas have been given quite apart from the quantity you may have dredged—whether the sectional areas exist at the places set down by Mr. Barton?—They do.

3946. Have you taken any sections?—I have.

3947. Can you produce them for us?—I did not keep any copy of them.

3948. You cannot give us any documentary evidence that these sectional areas, which Mr. Barton says are necessary, now exist?—No, I could not give you any documentary evidence. I merely took the ac-

counts for my own information to carry out Mr. Barton's views, and the number of cubic yards I took out.

3949. You can see quite well that you can take out a number of cubic yards without giving the sectional. Certainly.

3950. *Mr. Abernethy.*—You have never seen the sections of 1839?—Never. I never saw any sections only those I have with me here, and Mr. Barton never saw any sections either.

3951. *Mr. Barry.*—Do you recollect at Coleraine that I said to you this: "Shall you be able to put in any soundings of the places surveyed by Mr. Barton to show the Commission whether the depth of water required by Mr. Barton has been got?"—"Yes, sir, I can take a section of any part of the river. I have taken them repeatedly."—"Perhaps you could send it to the Commission?"—"I could." Then I say, "Would you kindly make your returns fit in with the figures and localities surveyed by Mr. Barton?" and so that you say, "Yes?"—"Well, it would take me some time to do that. I could do it if necessary."

3952. *Mr. Abernethy.*—Are there any floods at present?—Yes; we have had a few.

3953. The *Chairman* (to Captain Givens and Colonel Leslie).—Do you consider it is the duty of the trustees to see that these suggestions of Mr. Barry are carried out.

*Captain Givens.*—I do think so. I think that the Board ought to see that anything you require, and that we can produce, should be done. We are to blame, but it quite escaped me. I remember now the gentlemen asking for something to be done.

3954. The *Chairman.*—We have got these returns made out showing the amount of traffic. Are you taking any steps to increase that traffic, or do you see any prospect of any large increase in that navigation?

*Captain Givens.*—I cannot say that I do at present except by introducing foreign goods, such as are used in our country by steamers up the river, so that the steamers can get up and be able to put the goods upon the barge, to be carried up without being put on shore at all. That is merely to save the expense of landing.

3955. The *Chairman.*—Nothing has occurred since we were at Coleraine?

*Captain Givens.*—No; I do not know of anything at all. A second steamer has come on.

3956. The *Chairman.*—But unfortunately you have had a collision, I see?

*Captain Givens.*—They ran into one another. The old boat reduced her rates half to what they were to run in opposition to the new one. They were not, I think, very good friends, and they managed to run one another at the bar mouth—at the very pier.

3957. The *Chairman.*—Did they both go to the bottom?

*Captain Givens.*—No, a very trivial damage was done; but it was enough to make a good deal of talk. I am perfectly aware of the ground you take on account of the want of traffic. What we say is that the country has expended an enormous sum of money in erecting these works. I do not give any opinion as to the necessity originally for doing them, but there they are, and the country has paid for it, and it would be very exceptional reason that would sweep them away.

3958. The *Chairman.*—That may be considered. *Captain Givens.*—That we originally did not understand that we were responsible for drainage works I must acknowledge. I only joined the trustees myself in 1877.

*Mr. Barry.*—I hope it is quite understood that the Commission have come to no conclusion on this subject at present.

Adjourned to to-morrow.

## TWENTY-FOURTH DAY—THURSDAY, JANUARY 13TH, 1887.

JAN 25, 1887.

36, MARKING-SQUARE, DUBLIN.

Present:—Sir James Allport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq.;  
J. T. Pim, Esq.

Mr. William James O'Neill called in and further examined.

3593. The Chairman.—I believe, Mr. O'Neill, you have a scheme of your own for dealing with the river Basin—I have.

3594. Mr. Abernethy.—Will you kindly describe that scheme to us?—Perhaps it will be advisable to read a description of the scheme generally first?

3595. Mr. Barry.—What is the date of it?—The 9th June, 1886. The published report is condensed, but these are the details upon which it is founded, and I think this will explain it to you better.

3596. Mr. Pim.—To whom was that report made?—It is to the proprietors and all parties interested, and I am in hopes it will be taken up.

#### “DRAINAGE DISTRICT OF LOUGH NEAGH.”

“Based upon the Scheme, which we propose for further controlling the flood levels of Lough Neagh, Lough Beg, and the Lower Basin, so as to prevent the flooding of the low lying lands throughout this district.

“The above question has, for some time, occupied a considerable amount of public attention, and some careful and excellent reports have been written upon the subject, all of which set forth (with some variation as to details) that certain portions of the channel of the Lower Basin must be deepened, in order to prevent the floodings which have taken place periodically for several years past, and which form the subject of general complaint from parties interested.

“The works carried out and completed twenty-seven years ago, consisting of excavations in the channel of the Lower Basin, together with the arterial drainage works throughout the entire district, amounted to an expenditure of £302,122, of which £44,000 of the expenditure on the Lower Basin was charged to the Lower Basin Navigation, £8,513, for bridges, was charged to the counties, and £236,609 was contributed by the Treasury, leaving the balance, £110,000, which has been repaid by the lands drained and improved.

“The report of the Chief Engineer of the Commissioners of Public Works sets out in detail the great benefits which resulted to the district from the carrying out of the above project (the low lands in the neighbourhood of Agley, to some extent, excepted).

“The numerous waterfalls around Lough Neagh, formerly used to convey foot passengers over the floods, the masonry pillars erected along the banks of the river Blackwater, to indicate the course of the river in the former high floods, but now useless and partially removed; the levels of the old landing places for boats, the 4,356 acres of bogland from the beds of Lough Neagh and Lough Beg, and an inspection of Admiral Grove’s valuable chart of Lough Neagh; are some of the evidences of the existing benefits conferred upon the district by the measures carried out, resulting in a substantial lessening of the former high floods, greatly diminishing the frequency of flooding, and essentially accelerating the discharge of the floods, which now take place in wet seasons.

“Notwithstanding the above described improvements with drainage, it is generally admitted that further relief from floods is necessary.

“The natural features of this question may thus be briefly stated, viz.,

The rain basin, outside the flooded and injured lands, comprises an area of . . .	sq. reh.
Lands flooded and injured . . .	1,085
Area of Lough Neagh . . .	47
	133
Total area of rain basin, . . .	1,865

“The rainfall of this extensive watershed must pass down the channel of the Lower Basin river to the sea.

“Mr. Manning suggests in his report, that it is unnecessary to estimate the cost of a colossal expulse of conveying the volume of this rainfall to the sideway at the Cutts, so

as not to expose the surface of Lough Neagh. It is clear that such a project would far surpass the limits of a remunerative or reasonable expenditure.

“We have very carefully investigated the height and duration of the floods which have occurred in Lough Neagh for the last thirty-two years, from daily registers of the gauge at Toome, and find that

	Above summer level.
In two years its surface rose from . . .	4.0 to 6.6
For three . . .	4.2 to 4.8
“ ten . . .	3.2 to 3.3
“ twelve . . .	2.4 to 2.11
“ six . . .	1.3 to 1.6

In 1-55 its surface rose 4.6 in 45 days, and towards the close of the same year it rose . . .

In 1876-7 . . .	6.5 in 35 days.
“ 1876-7 and . . .	4.4 in 38 days.
In 1867 . . .	0.10 in 7 days.
In 1872 . . .	1.7 in 16 days.
In 1883 . . .	3.6 in 42 days.
“ . . .	2.2 in 33 days.

“These last given refer to the three years when the lake rose from 4.2 to 4.6 above summer level.

“From the foregoing we find that in periods of high floods the average rate of rise does not exceed 1-27 inches per day, although with short periods of seven days of the flood of 1877, it was 1-43 inches, and in a shorter period of two to four days the average rise is sometimes from 3 to 3-75 inches per diem.

“It is not these sudden rises of a few days which produce the high floods, but the gradual and protracted rising which results from two and three consecutive months of heavy rainfall. In the high flood of 1876, the average rise in twenty-four hours was 1-24 inches; in the almost as high flood of 1877 it was 1-27 inches.

“The rise in twenty-four hours (1-27) represents a volume running into the lake, in addition to the discharge at Toome, of 362,000 cubic feet, or a total of 730,000 cubic feet per minute which passed into Lough Neagh, over a period of thirty-eight days, and which produced the flood of 1876-7.

“The question to be dealt with is, how to convey this volume to the sideway at the Cutts, under such levels as will remedy the flooding complained of.

“We quite agree with the conclusions set out in the report of Mr. Manning, ‘that there should be a further deepening of the bed of the Lower Basin,’ and ‘that powerful sluices should be erected in the existing weir,’ in order to provide storage for floods in Lough Neagh, which latter as a storage basin, must always remain an important element in the drainage district.

“We have made a minute examination of the river channel, and have to recommend that considerable excavations should be made in the eastern channel at Loughan Island, several improvements between Loughan and the Cutts, and deepened from near the Loughan to Giff’s ferry, and over one shallow, shortly above the ferry. We propose to make certain improvements in the Maccosque, Aglishway, and Agley rivers, which will lower their flood levels, and to further protect these low lands by light embankments where necessary. Also to deepen the river over the shallows up to Carrick weir.

“The next important excavations in the river channel are in the rock at Portree, and in clay and gravel at Portglacosa.

“From the latter point, or the termination of Portglacosa shoal, there is a good river channel up to Lough Beg, with the exception of the selgy margins, and where two or three tributary streams have deposited bars extending considerable distances across the channel of the river.

“The next improvements required are in the new cut south of Lough Beg, at Breenat, and at Toome.

“It will, it seemed desirable, be desirable to extend the arterial improvements beyond the limits of the existing

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drainage district, where lands are liable to floods, or injured by not having sufficient face for drainage.

“It is the last twenty-seven years there have been carried out extensive reclamation and fencing of waste lands within the city limits of the district, and also improvements in arterial drainage; these have both contributed to materially increase the number of cubic feet per minute now discharged by the Lower Bann river, compared with what it was when the works were completed in 1836, or what would have been requisite when Mr. MacMahon wrote his report in 1845.

“We have, in our own interests, kept the amount of our estimate in this report as low as possible, and we are satisfied that if the works we propose be carried out, all causes of complaint from flooding will be removed from every part of the district, except where turf bogs have been cut for turbary below the level necessary for an efficient drainage.”

3963. I observe that in the report you speak of “we”—Yes; that is Mr. John Lanyon of Belfast and myself.

3964. Mr. Barry.—Mr. Manning has alluded to some obstruction at Portlengone. Is that included as one of the obstacles you would remove?—Quite so; it is mentioned here in connexion with the Portlengone improvement.

3965. What would be the estimated cost of carrying out the works you have suggested there?—£82,000; and of that we suppose £25,000 to be paid by the Lower Bann Navigation Trustees.

3966. Why do you propose that the sum of £25,000 should be charged against the Navigation Trustees?—Because Mr. Manning states that it would take that amount to remove what he calls their neglect.

3967. Mr. Abernethy.—What is the length, immediately above Carronee, that is under the jurisdiction of the Navigation Trustees and that they are liable to keep in order?—It is the entire river with the exception of a limited portion at each weir, that is to say, above the weir to the junction of the lateral cut for navigation, and below the weir to the junction of the lateral cut.

The Chairman.—Will you point those out on the map?—(Producing a map of the river).—It is this portion of the river which is coloured red. This is the portion at Moyansagher, and this is Carronee. I take this because it is a strong illustration. The part coloured red is maintainable by the Drainage Trustees, I presume, simply because, from the extremity of the red below to the extremity of the red above there is a special lateral cut for navigation; and again another reason is that the Drainage Trustees have an interest in keeping free access to the weirs and a free discharge from them.

3968. Possibly that separate canal takes that part out of the control of the Navigation Trustees?—There is a small piece coloured red at Carronee, but the lateral cut is very short. Still the same principle applies there, that where there is a lateral cut we are liable for the maintenance of the river.

3970. Mr. Barry.—Do you consider that those portions which have been under the control of the Drainage Trustees have been efficiently maintained?—Yes; we have only operated upon two, Carronee and Toomee.

3971. How many have you altogether?—Five.

3972. I think we have had evidence from the Secretary that some money had been spent at Toomee?—Yes; about £3,000 we spent in excavating the weir basin at Toomee, and we have also carried out about £50 expenditure at Carronee. These are the only two on which we have operated, the other weir basins are rapid, and there are no accumulations in them.

3973. Are they rocky rapids?—They are large boulders. I have no doubt there is rock in Portlengone.

3974. You think there is no accumulation in the other two?—I think there could not be.

3975. Mr. Abernethy.—These are the two basins you have operated upon?—Yes. Here is the point where the lateral canal joins the natural river, and here is the part where it joins Lough Neagh. This we did nothing upon, but below the weir at Toomee we spent £3,000 some few years ago.

3976. Mr. Barry.—What has been the total amount

spent under your control for maintenance since you took charge of the river?—We generally spend a thousand a year in salaries and works, but at the time this heavy work was carried out at Toomee there was raised for several years. I think one year it was about £3,000, but the secretary could tell you about that exactly.

3977. In what condition is it now at Toomee?—Above the weir there is a sand bottom; and there is only about from 2 feet 6 inches to 3 feet of water on it in summer, but it is very wide and I do not see that the water is at all obstructed in getting to the weir, the accumulation below tended to cause backwater on the weir, and that was removed. Originally the Board of Works excavated it from bank to bank, and on watching it from year to year I found that it accumulated each year a deposit on each side, and it gradually closed on the centre; I cut a deep channel from the central portion of the weir right out, and that deposit has not taken place in consequence because there is a weir.

3978. Mr. Manning reported, and his last report was 1884. He sets forth in that report various works which he recommended for the further improvement?—Yes.

3979. Are you aware of the nature of the works, and could you describe the modifications or difference in the works you now suggest and those recommended by Mr. Manning?—I am not quite certain that I could do so, because I find that Mr. Manning has put a new flood line entirely upon the river.

3980. I should like to know if you could give us the difference between the plan you now recommend and the plan suggested by Mr. Manning—what alterations you suggest and the extent of the alterations from the plan proposed by Mr. Manning?—I think it is much the same as what Mr. Manning proposed. I have not worked the thing out exactly or made working sections, but I am able to speak from calculations, that I have made from time to time, as to what is required, and I think it comes to the same as one of Mr. Manning's designs. He throws out many suggestions but he does not recommend one in particular.

3981. These are the suggestions of Mr. Manning; “First. The channel of the Lower Bann should be restored to the capacity designed by Mr. MacMahon?”—Yes, that he estimates at £25,000.

3982. Is that included in your scheme?—That is included, certainly.

3983. A similar work?—Yes; our work does not stop there, but that work is included in it.

3984. Then “Secondly. The discharge of the weirs at Toomee, Portlengone, and the Cuts should be rendered more effective by the construction of powerful sluices in each of these.” Is that included in your scheme?—That is included in ours.

3985. Then “Thirdly. Additional excavations should be made at Longfin Island, and the lower parts of the Mesquin, Abbevoey, and Agwey tributaries should be improved and embanked.” Is that included in your scheme?—These also are included.

3986. And to the same extent?—I think about the same extent.

3987. Then “Fourthly. In order to moderate the effects of such a flood as that of 1877, and of other exceptional floods of less volume in a greater degree, additional excavation in rock should be made above Portlengone weir, so as to render the increased power of discharge by the sluices more effective.” It would be well to let us know that?—Yes, that is included also.

3988. That is a work of consequence?—Of course, it is indispensable.

3989. Mr. Barry.—Would that fourth item include the excavation at Portlengone?—Certainly. That is really a thing that could not possibly be left out.

3990. Mr. Abernethy.—He estimates the cost of all these various works at £26,000, and your estimate is £82,500?—Yes.

3991. I do not think we have Mr. Manning's

estimate in detail. Do you know what his prices were?—I could not say exactly.

3922. Have you your estimate in detail?—No, I have not. The river excavation, in round numbers would be about £160,000. This is only a preliminary report.

3923. We should like something more than round numbers. We should like to have your estimated details and the actual quantities, if possible?—Very well.

3924. Mr. Barry.—Have you taken out the quantities?—I have.

3925. And moneyed them out?—And moneyed them out. I left the figures with Mr. Lanyon, because I knew nothing at all about the electrical part of it, and he went into the sluices, too.

3926. Mr. Abernethy.—Could you furnish us with the details?—Yes, I can send them.

3927. Mr. Barry.—Is it your opinion that if that sum of £282,500 was spent upon the Lower Bar that there would be no complaints about flooding?—It is.

3928. That would be a radical cure?—I believe it would.

3929. Mr. Abernethy.—From your evidence, very considerable improvement has taken place in consequence of the works that have been carried out up to the present time?—Very considerable. I have been very busy preparing for this inquiry. It rather came on me by surprise, and I really could not get the sections finished; but this is a section I have plotted of the present state of the river. [Producing same.] And you will observe that I show the former floods before the works were carried out. Then there is the very extreme floods of 1876 and 1877 shown by the second line. I will finish this section and make a tracing of it and forward it to the secretary. Then this other line shows the average flood level for the last thirty-two years, which is simply three feet above summer level in Lough Neagh. You observe the former flood line which is approaching nearly the horizontal, and of course it would have remained the greater part of the year on the ground; but here the slope of the surface flood is so great that it goes off in a comparatively short period.

3930. What is the dotted line?—That is the weir at Porton; and this is the natural channel at Portglenone. That is Portglenone Bridge.

3931. This is the summer level?—Yes, this is the summer level, and this is the bed of Lough Beg. The bed of Lough Beg is very high.

3932. You think the effect of your works, if carried out, would be to reduce it uniformly to about summer level?—We should endeavour by the sluicing to keep the work at all times as near as possible to summer level, because one great element, as I have stated in that draft report, of this question of drainage, is providing storage in Lough Neagh; but if provision is not made for providing storage the works must be increased to relieve the Lough from flooding.

3933. You state that formerly, before the improvements were carried out, the course of the river Blackwater had to be indicated by pillars?—Quite so, and in the Barrow and since the drainage they have been removed.

3934. That is to say all lands flooded, were flooded on each side of the river, and the course of the river proper was indicated by pillars?—Yes, by pillars, on the Blackwater and to my knowledge these are removed and I think some of them are on the ground yet, but have fallen to decay.

3935. Since the Blackwater has been embanked those pillars have been removed?—Yes, either removed or fallen into decay.

3936. Are the lands on each side of the Blackwater subject to floods now?—In heavy rains they are. I have a section of the Blackwater here.

3937. Is that from the rainfall or from flooding from the river?—Well, of course it is primarily from the rainfall which causes a certain amount of rise in

the river, and I am speaking of a portion of the Blackwater not embanked.

3938. I should like to see that?—[Producing section of the Blackwater.] This is Lough Neagh and this is the level that was cut through the shoals. Formerly these shoals rose above that line and this was the summer level. There is the former summer level shown and also the embankments. These are also the levels on the top of the embankments.

3939. There is no embankment carried beyond that point?—No; that is a point about a mile and three quarters above Verner's Bridge.

3940. From that down to Lough Neagh it is not embanked?—It is not embanked.

3941. Mr. Pike.—Is the land between Verner's Bridge and Lough Neagh liable to flooding?—Yes, it is liable to flooding.

3942. Mr. Abernethy.—Why was it not embanked down below?—I can only speak from report. The county Armagh side of the river is only embanked on the Tyrone or northern side. On the southern side Sir William Verner is the proprietor, and from this point down he is the proprietor for a considerable distance; and I understand that the late Sir William Verner objected to having any embankments at all.

3943. And that portion is flooded now?—Yes.

3944. Is it flooded above where the embankments exist?—It is not flooded where the embankments exist except when there happens to be a breach some time, or where from the long continuance of high water in the river the sluices are closed, and the back water accumulating behind the embankment floods the low part of the ground. That is in some winters, but not always.

3945. How far from the edge of the river are these embankments formed?—I find that in part of the river there had been a kind of embankment before the Board of Works came there; and in such cases I find that the embankments are on the river bank; but wherever the Board of Works made new embankments they made them back from the slope of the river, and very nice embankments indeed.

3946. How far back?—It would vary from six to fifteen feet. The embankments being low the friction to the stream would be great. The embankments are only two feet six to four feet six in height.

3947. And on the margin of the river?—Yes. There is one exception where there is about six feet.

3948. Are these banks overflowed in ordinary floods?—Not at all; the ordinary floods do not reach to within three or four feet of the top of the embankment; but in very bad winters, such as we had in 1876 and 1877, they would come within a foot of the top; perhaps, in some of the lower places it would pop over and the tenants would come and seal it up and prevent it from going over, and when the floods subsided I get that portion raised.

3949. The bed of the river was considerably levelled and lowered in the Blackwater?—It was.

3950. Before the banks were formed?—I should say that it was carried out at the same time. These embankments are about three feet and two to one slopes on each side.

3951. Mr. Barry.—Are the banks all under your superintendence?—They are.

3952. Do you find there is any great expense in maintaining embankments?—No, very trifling.

3953. Do you find any wilful damage done to the embankments?—Sometimes parties cut them to irrigate meadows and to feed flux holes.

3954. Have you any power of fining such people who do wilful damage?—Yes, there is special provision in the Act. I think the penalty is £10.

3955. You can bring them up before the magistrates?—Yes, but then we can never find out who does it.

3956. Do you find that the banks are damaged by cattle?—Well, very considerably.

3957. Such damage I suppose you make good?—We make good.

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4028. Out of the maintenance rate of the whole drainage?—Out of the maintenance rate of the whole drainage.

4029. Could you give us any idea as to the cost of maintaining the banks on the Blackwater as separated from the total maintenance charges?—I could look over my books for the last twenty-seven years and I could send it on.

4030. You could also tell us the length of banks you have to maintain?—Certainly.

4031. We should like to have that. Do you also maintain the sluices?—Certainly.

4032. And you also maintain the back drains?—Yes.

4033. Mr. Abernethy.—Are the back drains immediately behind the embankment or some distance from it?—In some cases immediately behind the embankment—some short distance behind—not immediately at the toe of the slope; but in other cases they are a considerable distance from the embankment.

4034. And these are the back drains you maintain?—These are the back drains we maintain. The fact is, I put the Trustees to maintain drains not marked in red on our maps, as they are back drains.

4035. What depth are those back drains you maintain?—Many of them have been what is technically called muddled, for turf or peat, and they are three or four feet deep under summer level, and are very difficult to maintain under such circumstances.

4036. What depth would that be under the surface of the ground?—That would vary very much indeed. The average would be about four feet.

4037. Mr. Pies.—Are they deep enough to allow of thorough drainage of the land behind?—Not in all cases. The people do not thorough drain the meadows with us, and it is partially those meadow lands, and sometimes it is cut-out bog, that is really fit for nothing.

4038. Mr. Abernethy.—It is mostly pasture land I suppose?—All meadow, and sometimes, as I say, it is cut-out bog, not fit for cropping; but sometimes people take a lot of turf out.

4039. Pasture land would not require draining to four feet below the surface generally?—Our lowlands are suffering very much from want of drainage. We have been gradually getting worse for the last fifteen years.

4040. In that district?—In the entire district of the Blackwater, but not so much as the Bann.

4041. Mr. Barry.—What is the soil of the bottom of the river Blackwater?—In some places it is peat, and sometimes clay, and sometimes gravel.

4042. Do you know what the banks are made of?—Yes; the best of our banks are made of very coarse sand; sometimes they are made of peat and sometimes of clay. In any reconstruction I make when I am on soil of that kind I mix peat and sand together, and it makes a very good job. When you make it entirely of clay it cracks in the summer time, and those cracks never close.

4043. Mr. Abernethy.—Your banks are not of very great height?—They are not.

4044. I suppose you find embankments of that sort made from the ordinary soil sufficient to keep the water out from the land behind?—Yes, except it is entirely of peat, and then we mix clay with it. We get clay at the nearest point and mix with it, and it makes a very good embankment.

4045. Mr. Barry.—What is the width of the top of the banks?—About three feet on the average, and with slopes of 2 to 1 on each side.

4046. Mr. Abernethy.—I have been over the various works suggested by Mr. Manning, which you say are all embraced in your scheme. Are any additional works beyond those embraced in your scheme?—Nothing additional, except the appliance of electricity to make the sluices self-acting, and I am not able to

say anything about that, because I do not understand it. That is Mr. Leary's part of the scheme.

4047. Mr. Barry.—To return to the evidence about the Lower Bann now. There would be a balance of 257,500 on your estimate to be provided, would there not, assuming that 425,000 is paid by the Navigation Trustees? How would you propose that that sum of money should be provided?—Well, I do not propose anything, but I assume it would be under the powers of taxation of the Lower Bann Trustees.

4048. I am talking of the 257,000. How would you suggest that that sum should be provided?—We do not suggest anything as to that. Of course naturally it would be a question for the proprietors. The late Land Act has changed the position of the proprietors entirely. I suppose it would be attended with some difficulty, but the general feeling amongst the tenants is that they think the Government should do it. Of course those are matters which I do not interfere with at all.

4049. Who would be the parties who would gain benefit by such an expenditure as you have indicated? I will put it first of all that there are the riparian owners on the Lower Bann, are there not, whose land is flooded?—Yes.

4050. Secondly, there would be the Upper Bann proprietors, or occupiers, who would have the benefit by the lowering of Lough Neagh, I presume?—Yes.

4051. Would the Blackwater proprietors benefit at all?—They would.

4052. How would they benefit?—The Blackwater floods which close the sluices would go down much more rapidly than what they do at present, and therefore I take it would be a very material advantage.

4053. So that you think that all the interests of the occupiers of land as to which the drainage is defective would benefit by such an expenditure as you indicate?—They would benefit, but not equally of course.

4054. What is the area of taxable land?—29,587 acres in the total.

4055. Does that include all the land?—That includes the entire of the lands.

4056. Those are lands subject to flooding?—No, that is the whole area, the whole area liable to taxation now for maintenance and that formerly paid up the original outlay, amounts to 29,587 acres 2 rods 32 perches.

4057. I should like you to define what that area is. We have here the area of drainage?—It is the scheduled area on the award. Those are exactly the lands that are coloured green in the book of maps which I have here—the lands coloured with the solid green tint.

4058. Mr. Barry.—The 29,000 acres to which you have alluded are the lands coloured green on that map, which is attached to the award?—Yes, and all those lands were not flooded. Some of them were flooded and some of them partly improved; they were relieved from what is called saturation.

4059. Mr. Abernethy.—Seeing that there are so many important tributaries, such as the Blackwater and other rivers, all the way down, which flow into the Bann and into Lough Neagh, do not you think the area of taxation ought to be extended to the catchment basin of the river—the whole area, more or less?—That is a question I am not prepared to say anything about except this, that I understand there was such a thing contemplated in England as a River Conservancy Law, by which there should be power to tax the people whose lands, although not benefited, contributed the water that did the harm; and that we found in many cases that really to relieve land from floods it becomes burdensome, not to say, in some cases, impossible. I carried out a small drainage district in Tyrone some years ago, and the charge was £10 an acre. We spent £5,000 to relieve about 500 acres. That is a very heavy tax. I find by Mr. MacDonagh's statement here that only £5 15s. has been spent on the Lough Neagh district per acre. I have

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been going over that district now for some years, and I never heard any person complain about the tax at all—never, on any occasion. I take it that it is simply from the fact that the work was done right, and they are relieved from floods. They have never had floods since the works were carried out.

4060. Do you think it just to the 20,000 acres you speak of, which is the worst area, that the whole £82,000 should be expended, and that they should bear the taxation of that large sum?—Yes, I think it would pay them very well. I think the tenants would be better able to pay their rents, in addition to the tax, than they are able to pay their rents without the tax, simply because the improvement of the land would put them in a better position entirely.

4061. Mr. Barry.—The original tax has ceased altogether, has it not?—It has. There is a thing but the maintenance, and that is on the average £1,000 or £1,200 a year over 20,000 acres.

4062. Mr. Abernethy.—Have we the area of land subject to floods on the Upper and Lower Bann; was that 20,000 acres subject to floods?—Certainly not.

4063. Mr. Barry.—Subject to floods or improved?—They are not subject to floods.

4064. Mr. Abernethy.—They are wet lands?—Yes.

4065. Mr. Barry.—I think you said, as I understood that the original tax was over £5 an acre. I make it out to be under £4?—Perhaps I was mistaken.

4066. The awarded sum was £110,000?—What was in my mind was that Mr. Manning, without allowing for what is granted by the Treasury, states there was £5 7s. 3d. an acre laid out on the lands; but deducting the allowance made by the Treasury, it only comes to £3 14s. 3d. That is on page 2 of Mr. Manning's report.

4067. So that the lands have never paid more than £3 14s. 3d.?—Never.

4068. And if this money was added to the charge it would come to something like £5 14s. 3d.,—that is, the £87,000 deducting the £25,000 to come from the Drainage Trustees?—Yes.

4069. Mr. Abernethy.—After this £82,000 has been expended what would the land be worth an acre?—I am not prepared to say exactly. There is such a great variety of land, one could only speak with certainty after a careful valuation. I have been asked by some members of the Royal Commission to find out how many acres are flooded at present in high floods, and I find it is about 18,000 acres.

4070. The Chairman.—Then practically it is the £330,000 to reclaim 18,000 acres, is not it?—It would be to relieve them from floods; but then the balance of the 20,000 acres would be very much improved, and of course, in the event of the works being carried out, it would require a valuation to be made of the lands before the works are carried out and afterwards.

4071. Mr. Abernethy.—Do not you think that as these various proprietors within the catchment basin of the river Bann and Lough Neagh contribute to and cause these floods, they should bear some portion of the tax, seeing that they are the cause of the floods?—I think it would be a very happy thing indeed for drainage schemes if legislation took that direction and that view of it. I think that those who contribute the floods certainly should pay a nominal tax, to encourage to deal with the floods below where people are injured, and all the valleys are so narrow, I think they should pay a tax for really good drainage.

4072. The Chairman.—What do you mean by a nominal tax, because a nominal tax generally means to pay nothing?—I mean spreading the tax over so large an area as has been done for the maintenance of the Lower Bann, in the Counties of Derry and Antrim; that is, a penny in the pound raises £1,400.

4073. It has been given in evidence before that it would be desirable to divide the catchment area in three zones—a flooded zone, a middle zone, and a higher zone, and giving a different rate of taxation for

each. Is that what you mean by a nominal tax?—Quite so.

4074. Mr. Barry.—Is it your opinion that, supposing you were to start afresh now, and spend £51,000 in the way you have indicated, that the benefit to the 20,000 acres of taxable land would be commensurate with the £57,000 you propose to spend?—I have no doubt about it.

4075. That at the present moment such an expenditure would be recompensed by an increase in the value of such land?—It certainly would. At the same time there are certain lands that I am aware would not derive much benefit.

4076. I am only talking of an average?—Yes. It is necessary to guard my answer with this, that I am aware there are certain lands that would not be benefited very much, and are pretty well at present; but, then, on the other hand, I would extend the area, if power exists to do so, beyond the limits of the present district, because since these works were carried out there has been very extensive excavations for timber purposes throughout the district, and lands that were quite high and free from flood—that is bog lands at the time Mr. MacMahon's report was made, and the works carried out have since been lowered.

4077. But my question was whether the 20,000 acres would benefit to the extent of £3 an acre on the average, quite irrespective of any other land?—On the average they would. I may state that in valuing lands myself on the Upper Bann, I have deducted 10s. per acre per annum from the land for defective drainage.

4078. This would amount to £10 per acre at 5 per cent?—Yes, I think about that.

Mr. Barton, Captain Green, Colonel Leslie, and Mr. Graham, representing the Lower Bann Navigation; and Mr. O'Neil, Secretary of the Lough Neagh Drainage District, were here called in.

The Chairman.—Mr. O'Neill has been explaining to us some works which he has suggested, and we thought it necessary to hear him alone. The further questions that will be put to Mr. O'Neill it is desirable you, gentlemen, should hear.

#### Examination resumed.

4079. Mr. Barry.—When did you take charge of the drainage?—In the autumn of 1859.

4080. Have you read the report signed by Mr. Barton, and dated March 10th, 1859?—I have.

4081. When do you say that the works of the Lower Bann were absolutely completed?—They were absolutely completed some time prior to 1859, with the exception of the widening of the channel through Lough Beg, and, if I remember rightly, I think Mr. Barton recommended that the channel should be made wider than was provided for in Mr. MacMahon's report, and that, in consequence, they sent down Mr. Boylan, one of their engineers, and had that work done. That was in, perhaps, 1859 or 1860.

4082. Have you been through the report of Mr. Barton, and could you give us any idea what the expense would have been in 1859 of doing all the works that Mr. Barton considered incomplete?—I could not say anything with reference to the state of the Lower Bann in 1859.

4083. Do you say that the works recommended by Mr. Barton were carried out between 1859 and 1860, or 1861?—I believe they were.

4084. Were they carried out under your direction?—They were not; I had nothing to do with them.

4085. You had not charge of it?—I had charge of the drainage district; but the Lower Bann, being in the hands of the Lower Bann trustees, I had no power to interfere—that is the channel through Lough Beg.

4086. That portion had been already handed over to the navigation trustees?—It had been handed over.

4087. I should like to direct your attention to

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another report of Mr. Barton's, dated July 30th, 1881. Mr. Barton says, at page 63, he submits 71 tracings, containing 424 sections of the river. Have you ever seen these sections?—I have.

4088. Have you had an opportunity of examining the river at the places where these cross-sections have been taken?—I have had opportunities, but I have never had any direction with reference to it.

4089. At any rate you have not taken those cross-sections?—I have taken independent cross-sections of the river, but I have never made any cross-sections with reference to Mr. Barton's report.

4090. The *Chairman*.—Did you examine those sections, which you say you have seen, and test them by the state of the river?—No, I did not.

4091. You have merely seen them?—I have merely seen them.

4092. Mr. Barry. —How many cross-sections have you taken?—I think about 300.

4093. At about what dates were they taken?—1884, I think. It was at the time Mr. Manning made that report. I was employed by the Board of Works to take these cross-sections.

4094. Have you had an opportunity of comparing the general result of those cross-sections you took with those taken by Mr. Barton in 1881?—I have never done so.

4095. Could they be compared one with another—are they taken from the same datum?—I believe they are.

4096. They could be compared?—They are plotted to a different scale.

4097. Mr. Barton, towards the bottom of page 43, states that—

"In many places the channels shown are not nearly as large upon the working drawings as those given in Mr. MacMahon's report, and then again the channels as carried out were often still smaller than those shown on the working drawings."

Then he says—

"Upon the sections annexed you will perceive by comparing them that the present channels are, in many cases, larger than those proposed by the Board of Works, and where smaller, you will see that evidently, in many cases, there was a departure from the original drawing, the banks in many cases, having been formed in stone at a width less than that shown on the original drawings, and in other cases large stakes put in for the construction of the works have been left behind, and are now seen on the cross-sections materially hindering the flow of the river. The result of these insufficient channels has been to raise the food level."

Now may I ask what is the result of the cross-sections which you have taken touching the point raised by Mr. Barton, do you find that the channels are not nearly so large on the working drawings as those given in Mr. MacMahon's report?—In the present condition of the river I am aware that the sectional areas are deficient.

4098. That was not quite the question. The question was whether the channels on the working drawings are smaller than those in Mr. MacMahon's report?—I apprehend that the channels in Mr. MacMahon's report are set out in reference to the sectional area, and I have applied them on the same ground. I find now that the sectional areas are deficient.

4099. Have you been able to see the working drawings?—I have. I have seen the drawings that Mr. Barton got from the Lower Barn navigation trustees. The Lower Barn trustees' secretary kindly handed them to me.

4100. I think that is not what I want to find out. There were certain working drawings, I understand, from which the works were executed. Have you ever seen them?—The only drawings I have seen are the ones that Mr. Crookshank sent me. I think they were tracings of working drawings.

4101. Mr. Abernethy. —Have you had the means of comparing those working drawings with the sectional areas recommended by Mr. MacMahon in his

report?—I have never done so, and I have never been directed to do so. Of course, an examination of that kind is expensive, and unless I was specially ordered to do it I should not think of doing it.

4102. It would not be expensive if you had the two sets of drawings to compare the sections?—It would not be if the sections were taken exactly at the same places. Of course, taking the sections at two places there would be a difference in every case.

4103. Mr. Barry. —But the comparison to which we have been alluding is a comparison between two sets of drawings and not taking new sections?—I have not entered into that matter at all.

4104. Would you be so kind as to make the comparison between the working drawings, and what is shown in Mr. MacMahon's report?—Certainly.

4105. Then the next thing that Mr. Barton says is that—"The channels as carried out were often still smaller than those shown on the working drawings." Can you tell how Mr. Barton knew how the channels were carried out?—No, I could not say. You ask me to compare the working sections with the sections I have taken?

4106. No; with Mr. MacMahon's report. That is the first thing. Then, will you compare the working cross-sections with the sections you have taken?—Yes, I was going to observe that the sections I have taken Mr. Manning has.

4107. But you will have access to them?—Yes.

4108. Mr. Abernethy. —Will you compare the cross-sections suggested by Mr. MacMahon's report with the cross-sections that were actually carried out. Mr. Barton says that as carried out in many cases the channels are smaller than those recommended by Mr. MacMahon, and in some cases a little greater, but the general effect has been deterioration according to Mr. Barton. The sections you have to compare them with are the sections of the Board of Works showing the sections as actually executed?—I understood Mr. Manning to say yesterday that he thought there were no such sections in existence.

4109. The sections of 1859 he did not know of, showing the state of the river in 1859, when the navigation was taken over, but they will have at the Board of Works the sections of the channel actually carried out?—Those will be what are called the working sections.

4110. The *Chairman*.—I understood Mr. Manning to say yesterday they had the original sections as laid down by Mr. MacMahon in his original report; but I do not think he said they had the sections of the work when completed in 1859?—Quite so.

4111. Mr. Abernethy. —At the Board of Works there will be sections showing the channel carried out because Mr. Barton's report is to this effect:—"And then again the channels as carried out were often still smaller than those shown on the working drawings"—the working drawings being the working drawings of Mr. Otley?—Yes; I presume so.

4112. Then will you compare the working drawings showing the sections actually carried out with those recommended by Mr. MacMahon?—Certainly.

4113. Mr. Barry. —Since you took charge in 1859, I understand you to say you made no cross-sections till 1884?—Yes; I made cross-sections in 1877 for the drainage trustees, and that was the first time that I took a step to ascertain the probable condition of the river.

4114. Are they now in existence?—Yes; but I lent them to Messrs. Law and Chatterton twelve months ago, and they have not sent them back again to me yet. The Board of Works' cross-sections have been so much more frequently taken they could not get these aside.

4115. But the cross-sections for the Board of Works were taken in 1884?—Yes; but they are much more numerous. I took some three hundred cross-sections for the Board of Works, but when I took them for the trustees it was only a rough kind of thing, so I had only ninety cross-sections.



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4116. Would they be at the same places so far as the shoals are concerned?—Some of them very nearly. The fact is, I have marked the site of each on the maps that I have here.

4117. Could you also therefore compare those cross sections of 1877 with those of 1884?—Yes. I must write to Messrs. Law and Chatterton for them.

4118. Then Mr. Barton at the end of his report states—

"1st. Mr. MacMahon did not propose to provide sufficiently for the floods. 2nd. That the working drawings did not provide for large channels as Mr. MacMahon contemplated. 3rd. That the work as done was in many cases short of the work shown on the working drawings; and, 4th. That some silt has since accumulated to the extent I have shown, which can be removed at the cost named in my estimate."

Then the total quantity which Mr. Barton gives in round numbers is 68,000 cubic yards which he divides in the proportion of 48,000 cubic yards to the navigation channel, and 20,000 to the drainage channel. Is it your opinion that that amount of silt is a fair representation of the amount of silt which has taken place owing to the neglect of the navigation trustees?—It is very well known that the navigation trustees did nothing to the river for eighteen or twenty years, except merely to the navigation channel. I should not like to give an opinion upon the subject as to the amount that was due to silt in any places where the work might have been deficient or due to shoals that were left behind. After such a lapse of time I should not like to give an opinion about it.

4119. You have told us that you think £25,000 ought to be charged against the trustees on account of neglect?—Well, Mr. Manning says so.

4120. Are we to take it that that is Mr. Manning's opinion and not yours?—I have no reason to differ from Mr. Manning's opinion.

4121. The Chairman.—Do you agree with Mr. Manning?—I have no reason to differ with Mr. Manning, because I took the cross sections upon which Mr. Manning gave that opinion. The river is deficient in area, but as to the cause of the deficiency I could not give an opinion.

4122. Mr. Barry.—Having taken the cross sections in 1884, did you then calculate the amount of deposit which you thought was due to the neglect of the navigation trustees?—No I merely calculated the amount of deficient area, but I never for one moment entered into the cause of that deficient area.

4123. You have calculated the amount of deficiency of area?—Yes.

4124. Could you tell us how many cubic yards that was?—338,000 cubic yards.

4125. Mr. Abernethy.—When you calculated that deficient area, what sections did you compare your sections with?—I did not compare my sections with any sections. I compared them with the sectional area—namely, 2,400 feet under a certain flood level—and that was Mr. MacMahon's, except in one reach of the river. As to the principal part of the river, he said 2,400 feet was the sectional area.

4126. As it ought to be?—Quite so—that is under a certain flood level.

4127. But you did not compare your sections with any other sections when you arrived at that deficient quantity?—Certainly not.

4128. My question was, how many cubic yards would, in your view, have to be removed out of the river?—I give that as 338,000 cubic yards.

4129. The Chairman.—That is of stuff to be taken out of the river?—Yes.

4130. How do you account for the great difference between 68,242 cubic yards and 338,000 cubic yards?—I do not know.

Mr. Barton.—May I suggest a question to elucidate this point. In estimating 2,400 feet as the sectional area, which Mr. MacMahon originally intended, does Mr. O'Neill take into account that certain portions of the river had a very much larger sectional area than

2,400 feet, or did he take every part that was less than 2,400 feet and estimate it to be cut out, because that would make an enormous difference in the calculation.

4131. The Chairman.—Was that so?—I only reckoned the 2,400 feet area to the shoals, which were excavated by the Commissioners of Public Works. Of course I am aware that a great portion of the river was sufficient to take the water under a fall of two or three inches to the mile owing to its excessive sectional area. The 2,400 feet sectional area refers to those shoals in the river that were deepened by the Board of Works.

4132. Mr. Barton.—Not in any drawing that shows 2,400 feet to be taken out of these shoals?—I found, on taking cross-sections over this portion, excavated by the Drainage Commissioners, that they were very deficient in area, but I have no means of ascertaining to what cause the deficiency is to be attributed.

4133. Mr. Barry.—Out of the total quantity of cubic yards you have given how much was soft soil and how much rock?—I have not distinguished between them.

4134. You had no possibility of distinguishing?—No opportunity, except in the case of Portna.

4135. Does it include the Portna shoal?—It does.

4136. The Portna shoal could not have been the result of the neglect of the navigation trustees?—It could not, said Mr. Manning. I remember admitted yesterday that there was some deficiency there.

4137. At Portlengone also the bottom of the river is rock, is it not?—No it is not. It is only at Portna and the Cutts where it is rock. It is clay and boulder, and gravel.

4138. Could that have been silted up?—Well, really I do not know. There are great quantities of bricks brought from the country brickfields to Portlengone, and I dare say they have tumbled a lot of their rubbish into the river after emptying their bricks. I know that a short distance below Portlengone bridge there are only two feet of depth in the greater width of the river at summer level. There is a very bad river at Portlengone. I know the foundations of the new bridge are deep, and it would be a strange thing if the Board of Works did not deepen the river in accordance with the bridge they build. I think that is what Mr. Manning wished to call attention to yesterday.

4139. Mr. Abernethy.—Did you find that it required 338,000 cubic yards to be excavated from the bed of the river to give the sectional area which you have just mentioned of 2,400 feet?—Quite so; to get that area over the shoals. That was Mr. Barton's question—that that evidence is confined to the shoals that were excavated by the Commissioners of Public Works.

4140. What length of the river would those shoals extend over?—I think about seven miles, but I do not know that I am quite accurate about that.

4141. Is it all a uniform fall over those seven miles?—No; it is not.

4142. It varies?—It varies; and that greatly hampers out the reason for the difference that there may be between my results and Mr. Barton's. The shoals would be something of this description (showing a rough sketch to the Commissioners), and I have extended my cross-sections beyond the operations of the Board of Works. Therefore, that is my opinion as accounting for the difference between Mr. Barton and myself. I may have gone further on in the shoal.

4143. Do you suppose that in those varying falls the same sectional area was required throughout?—As far as the shoals were concerned. It may separate at this point, and then here it is much more. The 2,400 feet area under a certain defined flood line would be found, and then down at the other end of the shoal 2,400 feet would be found there. Then the Commissioners of Public Works were supposed to have

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excavated straight between those two points so as to give the same sectional area over the whole shoal.

4144. Mr. Barry.—There is one other subject I wish to refer to. Have you read a report by Mr. Barton of the 1st November, 1851, which is at page sixty-five of the book?—I have.

4145. I think I may put the effect of the report to be this, that by spending £85,000, and reducing the navigable depth of the river to six feet, there would be no floods of any importance in the district. I think that is the effect of the report?—I believe it is.

4146. Supposing that the navigable depth was reduced to six feet how would that affect your mode of dealing with the river?—It would not affect it at all.

4147. Therefore, to that extent you and Mr. Barton are in conflict, that you consider it would be necessary to spend £82,500 and Mr. Barton considers it to be only necessary to spend £25,000?—Yes; I understand that Mr. Barton proposes a measure of relief, but I hold that a measure of relief from floods—that is, a relief from certain floods, but not a relief from entire floods—would not satisfy the people. In the case of the Tyroone drainage that I have referred to, I said: "Gentlemen, this is going to be an expensive matter, but I do not believe in half doing drainage. If the lands are worth being properly drained, do it, but if they are not, let them alone;" and they took my advice.

4148. What level of Lough Neagh would you be able to maintain by your works, as designed?—The highest floods certainly would not rise higher than forty-eight feet above datum. That is the old summer level, and very rarely would they rise so high.

4149. That is what Mr. Barton says he will do. He says here—"Maintain the level of Lough Neagh at and under two feet over summer level, or forty-eight above datum"—From what I know of the Lower Bann and Lough Neagh, and the work to be done, I am obliged to dissent from that.

4150. I thought that would be your opinion?—I have gone carefully into the matter, and it is not a mere matter of opinion with me, but a matter of figures.

4151. You have made your exact calculations?—Yes.

4152. And you say to obtain the result that Mr. Barton says he will obtain will cost £25,000?—I do not exactly say that. I may state now that when Mr. Barton presented his report some years ago to the drainage trustees, I was then directed to meet Mr. Barton and confer with him upon the subject. Mr. Barton did not compromise any excavation in rock at Portna, and the consequence was that I think we spent two days, or part of two days, in discussing the matter. Mr. Barton ultimately said that I was right, and that it would be necessary to excavate through the rock at Portna, but he did not agree with me as to the quantity, and said it would not do to go in for such a large amount of work as I went in for. In presenting my report to the Lough Neagh Drainage Trustees, I said I believed the results contemplated by Mr. Barton would be realised in carrying out his work, but after all it was only a measure of relief. I do not know whether those words "measure of relief" occur in Mr. Barton's report or not, but I rather think the expression was used in a letter he wrote to the drainage trustees. I remember the words distinctly, but I held that a measure of relief will be of no use.

4153. But Mr. Barton says he will keep the level of Lough Neagh at forty-eight feet above datum. That would not be a measure of relief, but a real relief if he is right—would not it?—Yes, but I could not agree with that.

4154. Mr. Abernethy.—If he could do that, Lough Neagh is the key of the whole position. It depends on the level of Lough Neagh?—Yes; I intended to observe that Mr. Lanyon and I propose keeping Lough Neagh at all times, as far as we can, to summer level, but after a period of protracted rains, say two months' rain, we could not do that. Still, it would never rise

higher, and that only for a short time, then the forty-eight feet, but immediately the river would bear it, we should set the sluices to work, and provide space for the flood in Lough Neagh.

4155. You would nevertheless let it go below summer level?—No, which it does at present. It goes down some nine or ten inches now.

4156. Does that affect the Lough navigation?—It does. It affects all the navigations connected with Lough Neagh.

4157. If it goes below the summer level?—Certainly, if it goes below the summer level it affects the whole navigation of the Upper Bann, and the channels through Lough Neagh.

4158. Mr. Barry.—Do you know what the cost of making the rock excavation to which you have alluded in your estimate is at Portna?—£25,000.

4159. You told us yesterday that people had encroached on the banks of the Lower Bann, and had narrowed the river by so doing?—Yes.

4160. Has that taken place in many instances?—It has, and I believe it has materially affected those deep portions of the river where Mr. MacMahon proposed discharging the floods under a fall of two or three inches a mile. I believe now that when a flood is passing down the rise is much greater, and therefore is prejudicial to the drainage. I know there were places in which there are thirty or forty feet, and, perhaps, fifty feet taken off the channel of the river.

4161. Where the river is sluggish?—Yes, quite so. I also hold that the Lower Bann navigation trustees should have kept those parts dredged up.

4162. The Chairman.—Can you give the quantity of land that has been abstracted from the river since you have been engineer for the drainage board?—No, I can not.

4163. Did you know it of your own knowledge?—I know of my own knowledge in passing that much is the case.

4164. Have these encroachments been made of late years?—No; they have been gradual, and I say that the obstructions I complain about are in some cases below summer level—but on the whole that these are the things that should have been dredged, and that dredging should have been always going on.

4165. It was stated by one of the witnesses that some houses have been built on land gained from the river; is that so?—Not that I am aware of on the main channel. There is a channel near Toome called the Old Bann, and it is now practically closed up. I think it is very likely that is what was referred to yesterday. That is about a mile below Toome. I am not aware of any houses being built on the intake from the main river.

4166. Mr. Barry.—Have the drainage trustees ever complained to the navigation trustees of any of these encroachments?—I think not.

4167. The Chairman.—Have you called their attention to it?—I have not.

4168. Why not. If you have seen these encroachments, as engineer for the trustees, why have you not called their attention to it?—I do not consider it necessary to call their attention to it, because there has been for a considerable time correspondence between the drainage trustees and the Lower Bann navigation trustees, and generally the drainage trustees made a complaint that the navigation trustees were not doing their work.

4169. Have you called the attention of the drainage trustees to these encroachments?—Not to these particular encroachments on the wide parts of the river.

4170. Did you consider it your duty to see these encroachments going on and not mention them to the trustees?—How would the trustees get acquainted with these encroachments if they were not informed of them by their officers?—There is no other way they could get acquainted with them. The first time my attention was directed to that Lower Bann was in 1837. I was told then to inspect the Lower Bann.

and take cross sections, and find out if the river was in the condition at that time proposed by Mr. MacMahon in his report. I took these cross sections and found they were not, and reported accordingly.

4171. Did not you point out to the trustees where the river was deficient?—I did.

4172. Did you point out then that these encroachments had been effected?—I did not, because the principal cause of complaint was upon the shallows.

4173. Have you ever since 1877 pointed out to the trustees these encroachments up to the present time?—I have not. I mentioned them in my evidence given before a former Royal Commission, and that is the only way in which I have officially mentioned the matter.

4174. Mr. Pies.—Were the drainage trustees themselves aware that these encroachments had taken place?—I think not particularly. They were aware generally of the deficiency of the Lower Basin, and until there was something done I did not see the necessity of going into particulars.

4175. Mr. Barry.—Was your report of 1877 in writing?—Yes; it is in print at page 61 of that book.

4176. The Chairman.—I do not see a word in the report with regard to these encroachments you speak of?—No, because the shallows were the principal obstacles in the river to the drainage.

4177. Surely taking, as you have now stated, fifty or fifty feet from the bed of the river, is a very serious encroachment upon the river, and a serious injury to the flow of the river—is not it? Do you not consider that it is a very serious injury to the outfall of the river?—I should say so.

4178. Then why did not you mention it?—Because for eighteen or twenty years the Lower Basin Navigation Trustees never owned that they were responsible for the river.

4179. Still if you found out a cause like that for the bad state of the river I should have thought you would have called attention to it?—It was generally known that the river was getting worse.

4180. Mr. Pies.—Was there ever any complaint made then or brought before the Board of Works respecting the condition of affairs at that time?—I could not say. The secretary could, perhaps, tell that.

4181. The Chairman (to Mr. O'Neil).—Have these encroachments been mentioned to the Board?

Mr. O'Neil.—I do not think these encroachments particularly have been mentioned.

4182. The Chairman.—Have any been mentioned?

Mr. O'Neil.—Yes; the state of the Lower Basin has been brought before the Board, and there has been correspondence on that subject between the drainage trustees and the trustees of the Lower Basin navigation. I have a copy of some letters that passed between them on the subject.

4183. The Chairman.—That is not quite the question I put. Has the attention of the navigation trustees been called to these encroachments by farmers, land owners, and others upon the River Basin?

Mr. O'Neil.—Not that I am aware of—I never heard of them before.

4184. Mr. Barton.—Before leaving that point perhaps Mr. O'Neil might state where these are, so that the gentlemen connected with the Lower Basin navigation who are aware of the circumstances may be able to refer to them, and perhaps make some statement on the subject. Could Mr. O'Neil state where these encroachments are?

The Witness.—There are some at the lower side of the junction of the river below Portloman bridge.

Mr. Barry.—If Mr. O'Neil is asked to specify them he ought to have more time given to him to do so.

Mr. Barton.—Perhaps he will furnish us with a list of them?

4185. The Chairman.—That is the proper course. (To the witness).—I think you had better make a

memorandum of them and supply the Commission with the localities and the extent of these encroachments, and if you can add to that the dates or about the time the encroachments have been made?—They would be very gradual, of course, and commence at the bottom of the river.

4186. As long as they were open to the river they would not be encroachments; you stated yesterday that the land had been taken in by the farmers and people on the banks?—Yes.

4187. Mr. Barton.—Mr. O'Neil explained with regard to a report of mine which came before the Drainage Trustees, and as to a conference which he and I had upon the subject, in which he urged that there should be an extended outfall at Portna. I want to ask a question or two with reference to this, so that my evidence on the subject may not seem to conflict with his in any degree that I can avoid. (To witness).—This is a letter of yours dated the 31st June, 1883, and you state here: "Now after a lapse of twenty-four years it is found requisite, as you have told down in your report, and I am satisfied you are correct, to seek to deepen the channel so as to adapt it to discharge 585,000 cubic feet per minute, instead of 400,000." That was your opinion at the time?—Yes.

4188. You do not want to give any explanation of that?—That is my opinion still with regard to the flood volume.

4189. You stated the whole thing, I think, in a report that you prepared for the Trustees? I do not know whether it was submitted, but you sent me a copy of this on the 17th of February, 1883, and you state:—"The records of the last twenty years of the floods lead me to concur with Mr. Barton as to the desirability of providing for maximum flood discharges at 585,000 cubic feet per minute between Toome and Portna under a specified flood line." Then, in that report you go on to say, you differ with me as to the point of there being sufficient excavation at Portna; when we met and conferred about that do you remember the quantity of excavation at Portna which we agreed should be added to my estimate?—I believe you recommended £10,000 should be laid out.

4190. Did you agree with me that that £10,000 spent upon the rock at Portna would bring up the works required to accomplish what we aimed at?—Yes.

4191. The Chairman.—When you say what we aimed at, do you mean what was related to in your report?

Mr. Barton.—Yes; namely:—To keep off all the floods except such a flood as that of 1877.

4192. The Chairman.—Do you mean to exceed the capacity of the river beyond that in 1877?

Mr. Barton.—Far beyond it, that is to say, to make the channel capable of discharging 585,000 cubic feet per minute instead of 400,000 cubic feet which Mr. MacMahon had originally proposed. (To witness).—Then you report to your Trustees on the 23rd February, 1883, to this effect:—"Having been directed by the Board of Trustees to examine Mr. Barton's sections and other details of the scheme for the improvement of the Lower Basin, and also to report my own views in reference thereto, I now beg leave to submit the following observations:—Mr. Barton kindly attended at Lurgan on the 30th ult., and spent the day in explaining the several features and details of the project; on the 21st instant we have had a second interview, and this morning I have received a copy of his calculations for that portion of the river between Toome and Portna. The question being one of considerable magnitude, and the varied character of the river sections rendering the necessary calculations voluminous, the short time available for this inquiry will only admit of my being able to report in general terms. Mr. Barton's calculations are based upon the principle of carrying out such works as will adapt the river to discharging 585,000 cubic feet per minute from Toome to Carrara, and

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630,000 cubic feet per minute from Carragee to Cotts under the following flood flues, viz.:—

Lough Neagh,	at Mr. MacMahon's top flood line.	
Lough Beg,	5 inches under.	same.
Portlengnash,	8 " "	do.
One mile above		
Portna Weir,	10 " "	do.
Portna Weir, 5th.	9 " "	do.

"Mr. Barton calculates that the proposed improvements will have the effect of lowering the flood level at Agveey to the extent of twelve inches when 630,000 cubic feet per minute are passing down that reach of the river. The measures proposed for effecting the foregoing drainage improvements are:—1st. The lowering of the crests of the four weirs below Toome, to the extent of two feet below their existing levels. 2nd. The deepening of the river through the shallows at Toome, Brocart, Lough Beg, and Portlengnash, so as to adapt them to passing the estimated flood volume under the specified levels, and the deepening through the shallows at Loughane Island (with other minor improvements between Portna and the Cotts), in order to discharge 630,000 cubic feet per minute at twelve inches under the level to which a similar flood would now rise at Agveey. 3rd. To fix about 800 feet length of sluices in Toome weir in order to provide means of lowering the surface of Lough Neagh when circumstances will render it desirable, and also admit of its being done. Of this scheme generally, having examined the manner in which such cross-sections of a large number have been calculated as to results, I have no hesitation in saying, that the results anticipated by Mr. Barton will be fully realized when the works shall have been carried out, and when the flood volume passing over Portna weir does not exceed 585,000 cubic feet per minute. I am, however, of opinion, that this important project should receive further consideration; I find upwards of two feet of fall occupied by one mile of rapids in times of flood above Portna weir, produced by the lowering of the weir, at least eighteen inches of this should be utilized for drainage purposes, it would have a powerful effect in reducing the back water at Toome weir, and would therefore, be a substantial benefit to the flooded lands around Lough Neagh and Lough Beg, the Lagg and Culmore neighborhoods. The time would not admit of my investigating the question of diverting Toome weir, but Mr. Barton has made a series of elaborate calculations which appear to me to be favorable. However, the improvements I have suggested in the river bed above Portna weir involve the reconstruction of the discharges at Toome." According to that, with the after investigation we went into with reference to Portna, does your opinion remain the same?—It does not.

4193. Please explain, for should there be a discrepancy it would be desirable to have it now?—In consequence of my having taken so many more cross sections than I think were ever taken before over the lower parts of the river, I find that the cubes are very materially altered.

4194. Mr. Barry—You mean the dimensions?—The cubic yards to be excavated—that is to say, I have recently taken cross sections over portions of these shoals beyond what was operated upon by the Board of Works, and which at that time were thought to be sufficient, and in consequence of the larger number of cross sections I have a more accurate knowledge of the state of affairs.

4195. Mr. Barton—When do they exist?—I may say that they exist over all the shoals.

4196. Mr. Barry—I think I understand that you do not disagree with Mr. Barton as to the sectional area that is required, but you disagree with him as to the cost of attaining that sectional area?—Quite so.

4197. And you also disagree to some extent with Mr. Barton, I apprehend, as to the desirability of lowering the crest of the weir to six feet. You stated it would do no good at all?—I believe not. I believe the shoals, without disturbing the navigation, would

meet all the contingencies. It is just a question of what length of shoals should be put into each weir, taking the fall into account, which would be a very nice calculation.

4198. Mr. Barton—When you say you have made a very large number of cross sections I presume the chief portion of the cost of this excavation, you will admit, is between Portna and Toome—that is the chief portion of this estimate to make this channel sufficient?—No; there would be considerable excavation done at Loughane, on the shoals between Loughane and the Cotts.

4199. Mr. Barton—Will you let me know how many cross sections you have made between Toome and Loughbeg?—

The Chairman—I think we are mixing up two questions. We want to ascertain first of all how it came that the original plan for improving the river was not carried out, and how it was that since 1830 the river has deteriorated in its capacity so much. Then this question may come in very prominently, if the estimates originally were not sufficient, is it desirable to carry out what you now propose, and in which Mr. O'Neill agrees with you? I think we should like to have cleared up first of all that question, if it can be cleared up.

4200. Mr. Barton—The questions I am asking Mr. O'Neill are merely put because he is under examination, and I do not want to refer afterwards to a matter in which he is concerned without having first given him the opportunity of an explanation. I have asked for the number of sections between Loughbeg and Toome, as he has said he has made a closer examination now, which enables him to give a more accurate estimate of the quantity. (To the witness)—Will you tell me how many cross sections you have made between Loughbeg and Toome?—Twenty-four.

4201. Mine are thirty-nine, and therefore I do not think that needs much further examination. Then there is one more point. There was a report of yours to your trustees, dated the 27th February, 1873, which was published in the book which the Commissions have before them, at page 50, and there you say—"The flood passing over Portna weir this winter"—(that is the winter of 1873, and not the 1877 flood)—"measured 716,450 cubic feet per minute over a period of six consecutive weeks." Do you know how that can be reconciled with the table given at page 10 of Mr. Manning's report, where in 1873 the quantity at Toome is given during the month of January at 324,000 and in February at 420,000—you state that for six consecutive weeks it was 716,000 at Portna?—There might be a much greater quantity passing over Portna than what there would be at Toome.

4202. How much less at Toome—what is the proportion of the catchment basin below?—I could not say at present.

4203. It is about  $\frac{1}{3}$ th, I believe. You don't know anything about how it is to be reconciled with this?—No, I do not. Of course, I am aware that the question of water passing over Toome Weir is very complicated.

4204. But Portna is not complicated?—It is not.

Mr. Abernethy—But still there are a great number of tributaries that pass into Lough Neagh, below Toome Weir, and that would account, to my mind, for a considerable increase.

Mr. Barton—It might account for a difference of 30,000 to 40,000 cubic feet a minute.

Mr. Abernethy—It must be more than that, taking the Cloudy river and others—the discharge from Lough Neagh over Toome.

Mr. Barton—If it goes to Lough Neagh it goes over Toome; it is about a hundred square miles between Lough Neagh and Toome, and the whole thing being 1,800 odd square miles, it is about  $\frac{1}{3}$ th.

Mr. Abernethy—The Cloudy is the chief one.

Mr. Barton—Yes; there are several little streams,

but the enticement of them is very easily taken out on that snag.

Mr. Barry.—Was the discharge over Perina Weir measured more than once?

Mr. Barton.—It is regularly registered.

The Uffens.—I have it for every day in the year. Mr. Barton.—That is very fortunate, for it is a weir that is generally very clear—not drowned.

Adjourned for a short time.

Am 12 1887.

Mr. William James O'Neill.

Mr. James Barton examined.

4204. Mr. Abernethy.—Have you any statement to make beyond those embodied in your reports?—Yes, I have.

4205. Would you state what they are now, and we will take them in connexion with your reports?—I examined the works executed by the Board of Works for the Navigation of the Lower Rhine when they were nearly completed in the year 1859. That was for the purpose of the report which you have had before you, and I found the navigation channel not fully completed, especially through Lough Beg. I did not then investigate how far the works for drainage purposes were sufficient, and my statement, quoted by Mr. Manning, as to the creditable way in which the works were completed, referred to the locks and weirs and navigation, and did not convey any opinion as to the efficiency of the works for drainage. I was merely examining the matter for the navigation trustees, to see how the works stood which were handed over to them.

4206. That was in 1859?—Yes, and had nothing to do with drainage at all.

4207. Did you make a report in 1859?—Yes, and you have it before you. Mr. Manning, in his report, alludes to it, and speaks of it as if I had given it the time of approval.

4208. I presume you did not then suppose they had any legal responsibility as to drainage?—Quite so. I was merely asked to look into the question of a navigation channel and the locks and weirs.

4209. Mr. Abernethy.—You refer in that report to the report of Mr. MacMahon?—Yes.

4210. You had the report of Mr. MacMahon before you?—I had a copy of Mr. MacMahon's report before me, and I examined how far the works about to be handed over to the navigation trustees at that time had been completed. They had just been appointed, and they wished to have an examination of how far the works had been completed in accordance with Mr. MacMahon's report, and I investigated the question just so far as the navigation was concerned.

4211. I am referring to Mr. MacMahon's report of 1845?—Yes; it is given in full in the appendix to Mr. Manning's report, commencing at page 12. I again examined the navigation channel for the navigation trustees in 1861, and reported as to the amount of accumulations which had taken place in the river channel as far as it was under the charge of the navigation trustees. That report has been alluded to in this morning already, and I may explain now with regard to the contract drawings which I alluded to there, that the Board of Works and we have no definite set of drawings which show the works as they were completed, or as they were originally designed, but we will put all the drawings we have at your disposal, and let you select from them. There was a bundle after bundle of drawings all connected with the carrying out of the works.

4212. Mr. Barry.—To avoid confusion, we have alluded to them before as working drawings. Are there any other drawings?—No.

4213. You have spoken of them as contract drawings?—I should perhaps have kept to the expression "working drawings." They are what we ordinarily call "working drawings."

4214. Mr. Abernethy.—In your report of 1859 you say—"I shall now proceed to detail to you the works executed which are about to be handed over to you, nothing step by step how they agreed with the report of Mr. MacMahon." That was the report of 1845?—Yes; Mr. MacMahon's report of 1845.

4215. At page 23 of his report he summarizes the various works he recommends after a very long report in which he quotes the opinions of various engineers such as Mr. Farquhar Giles, Mr. Thomas Rhodes, Mr. Gregory, and others—all men of repute as engineers. After having quoted all their opinions and made a very long report, he summarizes, at page 23, as follows:—"First, I propose removing the present fishing cribs, and then separating piers, the agent's house and office, the old kiln, and as much of the ruins of the old mill as lie between the wheel race and the river." In 1859, when you reported, had that work been carried out?—I believe so. I never saw anything of these works. They had been removed, I presume.

4216. Then—"Secondly,—To set down the rack, or as much of it as may be required in the site of the proposed new cuts of fishing passages, and of the regulating weirs, to eight feet above datum." Had that work been carried out in 1859 when you reported?—So far as the navigation channel is concerned, yes. My investigation was confined to that. The cuttings that were made for drainage I did not go into at all. I examined whether the weirs were of the proper level, and got cross sections of them made to ascertain what they were. I can show you what they were if you like, but I did not examine anything connected with the drainage.

4217. Then—"Thirdly,—To reconstruct the free gap, or Queen's sluice, in the same site as the present one now occupies, with four new cribs extending from it, towards the western or Derry back of the river, and accessible from that side by a proper gangway; also to erect two regulating weirs obliquely pointed, and extending from these cribs on each side towards the sluice, that on the east side 150 feet in length, and that on the west 350 feet. The level of the coping of these weirs to be at or near the level of low summer water, so that all or nearly all the water may then pass through the cribs, and free gap."—That is at Cotts.

4218. Had that been carried out?—Yes, that I believe was fully carried out.

4219. Then—"Fourth, to excavate a channel for the navigation on the east side of the river,"—it should be the west side—"as close into the land as practicable, and let it to build a lock for passing the trade from one level to the other."—That was done.

4220. Next—"To remove the island which stands upstern of the Cotts, and a portion of the garden on the west side opposite to it, and excavate the rock in the upper weir basin to a sufficient depth to allow the water to come forward to the discharging line of the weirs without abstraction calculated to impede its motion or make a head prejudicial to discharge during the presence of the floods."—I did not investigate that question. I do not recollect going into that point, and it would not naturally come before me.

4221. Then reference has been made to the sectioned area of the channel, in fact in 1859; can you point out to me, because I cannot find it in this report, any definite description of those sectioned areas, except this passage:—"It is calculated that when the contemplated improvements and new works are completed, the greatest amount of water to be discharged during floods will rarely exceed 400,000 cubic feet per minute, therefore 550 feet of an effective line of discharging weir."—I am nothing about the channel definitely laid down here, except at page 23 in the right-hand column, and probably that is what Mr. O'Neill referred to, viz.—"It is provided for in this reach that the floods may rise at Carnes Lock the second

Mr. James Barton.

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In the *avancé* 4 feet in height, which will then give a declivity or slope in the surface of the river of something more than 5 inches per statute mile, with this fall "—that is, of 5 inches per mile—"a sectional area of about 3,400 feet of the Loughans will be necessary to pass the contemplated volume of flood water."—Had that been carried out?—I did not investigate that; that was a matter of drainage.

4298. We have had various references as to the condition of the river?—I can show you sections made at the Loughans in 1881.

4291. That is a long time after. The question arises as to the condition of the river as landed over in 1859, and this question of the sectional area of the channel has been discussed two or three times, but I have never yet been able to discover what the exact sectional area was that was proposed in this report—except this one passage?—I am not able to say what, in 1859, was the state of any part of the drainage channel.

4294. Then in fact the works suggested or recommended in the report of 1845 were all carried out; but, as regards the drainage channel, you are not aware whether they were carried out or not?—No; I am not at all aware whether they were completed or not. At that time, as probably the Commissioners are aware, the Navigation Trustees did not believe they had anything to do with the river, except the navigation channel throughout it and the locks and weirs. But since that an opinion was taken jointly between them and the Drainage Board in the year 1877, which states that although it is not a part of navigation work, nevertheless that the channel of the river from Toome to Coleraine is under their charge, and it was in consequence of their having got that opinion, and being led to see that there was a responsibility, which they were not before aware of, that they asked me, in the year 1881, to make for them a series of cross sections of the river, and ascertain whether then the channel was different, and how far different, and what it would cost to make good the difference between Mr. MacMahon's report and the present state of the river.

4295. Still, as regards the state of the river when you reported then, and what it was in 1859, except that one single passage about an area of 3,400 feet on given conditions, you had nothing else to compare the sectional area of the channel with?—No, I had not. In fact even so far as that, I did not go into it. My investigation being one as to navigation, I did not deal with this point.

4296. There was nothing in the terms of the transfer of the river which would indicate the duties that had to be undertaken?—I will show you the deed under which it was transferred. I have a copy of it here, and I will read to you the words on which this question has been finally decided:—

"And whereas the works necessary for the improvement of the navigation is necessary with drainage in the district of Lough Neagh, in the counties of Antrim, Armagh, Down, Londonderry, and Tyrone, have been completed pursuant to the provisions of the Acts in that behalf made and provided. Now, know ye that we, the Commissioners of Public Works in Ireland, acting in execution of the said Acts, do make this our final award as follows, that is to say, that the said navigation which has been so made, is the navigation of the Lower Bann river, from the Bridge of Coleraine to the tidal part of the said river, to Lough Neagh, and extending thence to the first lock or entrance to the Laggan, Newry, Ulster, and Coal Island locks, as more particularly shown and described by a (blank) colour."

I suppose in the copy there was some particular colour mentioned, but it is left a blank in this printed copy.

"On the map or plan signed by us of equal date herewith, and to be enrolled in the Lord's Office of Her Majesty's High Court of Chancery in Ireland; and the works commenced thereon are the works approved and set forth in the said map or plan, and in the schedule marked B herewith annexed. And we do further state and specify that the total amount of the costs, charges, and expenses—

Then it deals with the costs. These plans are in the hands of the trustees, I believe?

Captain Giffen.—Not the original plans.

Mr. Abernethy.—The plans that were signed with this award—the Ordinance sheet showing the weirs and so forth.

Captain Giffen.—Yes, we have them.

4297. The Chairmen.—You still have them?

Captain Giffen.—Yes.

The Witness.—But those plans do not show the channel for drainage. They show the locks and so forth.

Captain Giffen.—They show the plan of the channel but not the section.

4298. Mr. Abernethy.—We have seen that plan?—There was another award for drainage made at the same time, printing it in the hands of trustees; but there are some other words in this deed which I have not read you, in which the words "the bed of the river" are mentioned.

4299. In addition to the navigable channel?—Yes, when this question arose in, I think, about 1877 or 1878, after some correspondence between the two Boards, it was finally agreed to leave the matter to Mr. Ashmead—since Judge Ashmead—to give an opinion upon it, and he stated that in his opinion the navigation trustees of the Lower Bann were bound to maintain all the drainage channels which happened to be in the Lower Bann, except the particular spots that are excepted here, namely, the weir basins. This deed refers to the works "as per schedule B," and at the end of the document there is the schedule B, "referred to in the foregoing award, showing the works executed in the said district the maintenance whereof, as works of navigation, is to be vested in and to be undertaken by the Lower Bann Navigation and the Upper Bann Navigation Trustees respectively, appointed under and by virtue of the Act of 19 and 20 Victoria, cap. 62." Then it says:—

"Lower Bann Navigation.—The entire channel of the Lower Bann river as improved from the Bridge of Coleraine to Lough Neagh, except the portions adjoining the regulating weirs of Toome, Fectra, Movannagher, and Carrum, forming the respective weir basins, and extending above and below said weirs to the points of junction with the navigable canals or side cuts."

That is the first sentence. Then it goes on to describe the locks and the regulating weirs, and lock keepers' houses, and so forth, which I need not describe to you, because there is no dispute about them; but that point was only decided in 1877, and immediately, I understand, or within a short time afterwards, the trustees went into the question.

4300. Then I distinctly understand that all the works recommended in the report of 1845 had been carried out, but as regards the then condition of the channels in 1859 you had no means of judging what they really were?—None. Then I will go on to the next examination of it. I again examined the navigation channel for the navigation trustees in 1881, and reported as to the amount of accumulation which had taken place in the river channel so far as they were under the charge of the navigation trustees. The four principal weir basins of Toome, Fectra, Movannagher, and Carrum, were expressly excluded from the navigation trustees' charge, and in one of these, namely Toome, the chief deposit has taken place, and if that weir basin had been kept clear, little or no deposit would have taken place between that and Lough Beg, the chief obstruction to the channel from Lough Neagh being now carried from Lough Neagh over the weir at Toome and thence down the river and deposited when the current became sufficiently slackened to be unable to carry it further, and notably at the entrance to Lough Beg. In the future the basin above Toome weir should be kept dredged to a low level. I am still of opinion, as stated in my report of 1881, that the total quantity of water to be provided for in floods in such an excess of Mr. MacMahon's estimate of 400,000 cubic feet per minute. I differ decidedly from Mr. Manning's

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opinion that if the channels were made as originally intended, to carry 400,000 cubic feet per minute when the lake was at the flood level proposed by Mr. MacMahon, the lands would now be free from floods except such as in 1877. On the contrary, I have valued myself, and think I can show the Commissioners, that the quantity of water coming into Lough Neagh requires much larger channels, and that if not provided the result must be disappointment; and Mr. Manning by his report seems to suspect this, (in reference to his estimate, page 9, he estimates the amount to restore the works to what they were originally at £35,400, and then goes on to estimate a further expenditure of £18,500 and £12,500 to make them more satisfactory.

4231. That is beyond the works of 1859?—Beyond the works which Mr. MacMahon recommended. This £35,400 is his estimate to restore the thing to the position it was in in 1855. His second head is—“The discharge of the works at Tonne, Portno, and the ‘Cotts’ should be rendered more effective by the construction of powerful sluices in each of them.” He estimates that at £18,500, and then he takes further on of £12,500 for the third head—“Additional excavations should be made at Loughlin Island, and the lower parts of the Maccosquin, Aghadown and Agavey tributaries should be improved and embanked”—that is to say banks beyond Mr. MacMahon’s. Therefore, there is £30,000, omitting this last item of £38,000, which last item is to deal with such floods as occurred in 1877; but all before that is his estimate of works for ordinary floods. Therefore, although his report goes to this—that if the thing was restored to the condition it was in in 1859 it would be right, or fairly right, yet he certainly seems to agree with me that something more must be done or he would not recommend an additional sum of £50,000 to deal with the ordinary floods.

4232. But part of the works which he recommended was to restore the channel—that is really the main question—to the condition it was in in 1859?—Quite so.

4233. But except that single passage, referring to 2,000 square feet, with a fall of five inches per mile, there is nothing to indicate what the channel was in 1859?—There is nothing. There is a little something, however, I shall show you by and by, from the tracings I got from the Board of Works; but I maintain it is only a sort of elementary proof. There is this important fact, that he must more or less agree with me in the fact that the works projected in 1859, even if fully carried out, and which would have fully discharged 400,000 cubic feet of flood at a given level, would have been insufficient.

4234. The Chairmen.—Mr. Manning estimates the cost of putting the river in the condition it was in in 1859 at £35,400?—Yes.

4235. But I think I have seen in your estimate that you think £3,500 is sufficient for the navigation trustees to expend in putting it in that condition?—Not in putting it in the condition that was estimated by Mr. MacMahon, but putting it in the condition in which they received it in 1859.

4236. That is just the point which I want to get at, we have not got at it yet?—As to that I will explain to you, I did all I could to get at the facts with regard to that. I went to the Board of Works and asked for these drawings, to show what the works were in 1854, and they showed me all these drawings, they said you can see them. I found sections at Loughlin Island, sections at Tonne, sections at Portno and Portno, and a variety of places. I took those sections and ascertained, as far as I could, from an examination of them in detail—and I spent a long time investigating them as far as I could—the ones which purported to be the working drawings upon which the works were carried out; I then took those working drawings and compared them with the river outfall, and with the sections which I had made of the same places as the old cross sections were taken at.

4237. Upon what principle did you select from the mass of drawings you say were put into your hands, the particular drawings you supposed were the working drawings upon which Mr. O’Reilly constructed those works?—I took the most perfect drawings—the drawings which showed the details most accurately.

4238. Were there any dates upon those drawings?—Some of them, I think, and dates upon them, they all purported to be drawings connected with the works which were to be carried out upon the Lower Bann.

4239. Are these drawings in existence?—I have these drawings, these are the tracings I took in the year 1861 from the Board of Works’ drawings (producing some.)

4240. Mr. Abernethy.—What were the dates on the drawings at the Board of Works?—Some of them may have dates on them—at Movingsham there is a plan of the river on a large scale, the lock is shown in red—that is a plan to show the lock, and there are cross section lines; then here is another further plan of the same kind.

4241. The Chairmen.—Are these dated?—There are numbers of these that have no dates to them; they are traced as the original. Here is a note “pencil lines show cross sections from January, 1854.”

4242. When was that put on?—That was some note found on the original, and it was copied on this.

4243. In January, 1854, the works were going on?—Yes. Then “nothing done January, 1854,” that is the note on the cross sections—I assume these are the working drawings that were in use, and I selected one for every place.

4244. You took copies?—These are my copies.

4245. I observe all these marks are in pencil, and the rest in ink?—These marks were, no doubt, written in pencil in the original, and, therefore, I find them copied in pencil, but this red portion of all these cross sections here is undoubtedly the work intended to have been done originally. That would be the surface line of the channel, before they began to work on it, and that red line would be evidently the intended channel that was to be cut. I assume that in every case. Then, here is another note—“Dams partially removed.”

4246. This is when the works were going on in 1854?—Yes, and there are portions of those dams there still.

4247. I want to call attention to one paragraph you read in that regard to this effect, “the works being now complete”?—That is in the Board of Works award.

4248. Would they make that remark without satisfying themselves, or through their officers, that they were complete?—That I could not give an opinion upon. I am satisfied that there are things that were not complete.

4249. The Chairmen.—A question arises also upon this, with reference to the Navigation Trustees, the award stating distinctly that the works were completed, why did not the Trustees satisfy themselves that that was a correct statement before they took over the navigation?

Colonel Leslie.—They left it to the Board of Works, and had confidence in the officers of the Board of Works.

The Witness.—So far as the question of the channel is concerned I think they did all they could, they employed me to make that report at that time, to see whether the navigation works were completed, they thought they had nothing to do with anything but navigation.

4250. The Chairmen.—Did you see they were complete?—They were nearly complete as far as the navigation is concerned, this channel was not for navigation, but for the purpose of drainage.

4251. You read the words about the drainage?—The Drainage Trustees are for the Upper Bann.

4252. They were responsible for keeping the river

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to the Drainage Trustees!—It now turns out that the Navigation Trustees were bound to keep the Lower Bar, but from 1859 to 1877 they were not aware they were so bound—it was only an opinion given in 1877.

4253. Three words seem to me very clear, and any common sense man reading those words you read out must have come to the conclusion that they were bound to—When he comes to look at the river and finds a navigation channel cut through the bed of the river would he think so.

4254. They were bound to keep up the river and its works!—It does not say for drainage.

4255. Mr. Abernethy.—But still the navigable channel is in the bed of the river!—The navigable channel was right as I ascertained in 1859.

4256. It is in the bed of the river!—The excavation goes further than the navigable channel.

4257. Mr. Barry.—What do you call the navigable channel, could you give me the dimensions of it?—I think it is about sixty feet and in some places eighty feet wide, and cut down to a lower level for the purpose of allowing eight feet depth of water.

4258. Is it sixty feet bottom width and a depth of eight feet?—I think that was so. I dare say we shall see it marked on some of those sections—those are what I prepared in 1881.

Captain Giesse.—I think it is sixty and thirty—sixty at the surface of the channel and thirty at the bottom.

The Witness.—These drawings represent by a black line the bed of the river as in 1881 (producing some drawings). Wherever there is a red line shown it is from the Board of Works section as designed before they began, and therefore it would seem that in some cases there was a Board of Works section before they began. This green part is a channel which I, in my report, considered to be necessary in order to make this channel effective.

4259. Mr. Barry.—Effective for what?—To deliver the river from floods: to discharge 585,000 cubic feet. Then here are a number of red ones. Here is the channel, and that depth is what was shown on the Board of Works drawings as eighty feet wide there. That is for a navigation channel. This channel here, so far as they go below the present surface, I estimated as what ought to have been taken out by the Navigation Trustees, and to be their responsibility. But here is a case, and this illustrates one of the points I mentioned. Where I say Mr. MacMahon's works evidently were not carried out, there is a cross section in which there is a wall, at that side, and at that side at present in the river. The cross section in the Board of Works plan, which I copied, showed the surface line, and shows this to be cut to that, and to that level, right across, and up there [pointing beyond the walls].

4260. And behind the wall?—Yes.

4261. The Cross-section.—Shall we find that in these tracings?—Yes; but I have copied it in there. Then Portlough bridge is next to it. When I came to examine that place I found these hard boulder stones and clay, evidently not a deposit of silt by the river—large stones and heavy clay—which was a solid mass when I tried it with a small pointed iron bar, and I found the wall built here forming the margin of the river for a considerable length. It is quite evident that that was not originally cut out so that, and that it had not silted up to that wall. I therefore come to the conclusion that that work was not done. That is the only way in which I can come to the conclusion that certain things were not done. It was only when I found hard stone in the bottom, or the wall built at the side where the original channel was supposed to go further, that in these cases I concluded the work never was done, and never could have been done in 1859, and therefore certainly ought not to be done now by the Navigation Trustees in the maintenance of the works handed over to them in 1859.

4262. Who advised the Trustees in 1857, when the negotiation took place?—I do not think they had any advice, except that first report of mine.

4263. Mr. Abernethy.—That shows that certain works, at any rate, you think were not executed!—Were not done in 1859.

4264. But you have no means of comparing the state of the navigable channel, and you have already stated that except that single passage, referring to a sectional area of 2,400 feet, there was nothing to show the actual state of the bed of the river in 1859 for you to compare it with?—No; I had no sections whatsoever.

4265. Now will you go back to Mr. Manning's report of 1881?—I was stating that Mr. Manning's report seems to imply that something more was necessary than the restoration of the works to the state in which they were, even if completed in accordance with Mr. MacMahon's report.

4266. Mr. Manning at page 9 refers to certain works and their costs?—Yes.

4267. Do you recommend the same works to be carried out?—I have not seen his sections. I was very much astonished when I read those sections from Mr. Manning's report, because having made a larger number of sections, as it appears now, than he has made for the ascertaining exactly of the state of the river, and having calculated from those sections the work to be done, I consider I have all the data, and perhaps more than he had, for coming to a conclusion, and I do not suppose that Mr. Manning and I would differ materially in the price of the work to be done.

4268. I should like to take your sections on those works, and will you tell me in what way you differ from Mr. Manning. Take the first that he recommended:—First, the channel of the Lower Bar should be restored to the capacity designed by Mr. MacMahon—that is in 1859?—I am not able to say how much that would be absolutely because I do not know what state it was in. I have given an opinion that between £2,500 and £3,000 will restore the channels to the same state in which they were in 1859, as far as I am able to ascertain what these channels were from the Board of Works drawings.

4269. Then take the second?—The discharge of the weirs at Toome, Portna, and the Caste should be rendered more effective by the construction of powerful sluices in each of them?—I don't think it necessary to put any sluices either in Portna, Carrone, or Movinagher. I think that in those three weirs it would be quite sufficient to take two feet off the crest of the weirs.

4270. The first weir that you refer to is Portna?—Yes.

4271. You propose to lower that weir two feet?—Yes.

4272. What is the comparative difference between the crest of the weirs as they are now and the summer level of Lough Neagh?—Portna weir is 41 feet above datum, and the summer level of Lough Neagh is 44, therefore it is five feet below Lough Neagh.

4273. What would be the effect of lowering the crest of the weir as you propose at Portna on the summer level of Lough Neagh?—Do you mean if it was done simply by itself?

4274. I mean simply by lowering the crest of the weir and nothing more done?—It would have little or no effect.

4275. It would not lower the summer level of Lough Neagh?—I do not think so. It is the Toome weir that maintains the summer level.

4276. You would also deal with Toome weir?—What I propose at Toome weir is not to lower it at all but to put 300 feet of sluices in the weir at Toome.

4277. Then you would lower the Portna weir two feet?—Yes.



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4278. You are not proposing to put any sluices in that?—No; I do not see any occasion for sluices there, because I consider that six feet is sufficient for the navigation if you are to have any navigation at all. If you lower the weir at Portna two feet it enables you to carry up a channel through Portna itself all through the rock cutting there, and from there right up, to lower these shoals so as to produce a channel up to Toome which will discharge a great deal more water.

4279. Then this lowering of the crest of the weir involves the deepening of the channel for that length?—Yes.

4280. What is the depth of the bottom of the channel there?—It is 8 feet, and I took advantage of that, as 6 feet would be sufficient.

4281. Is that included in your estimate?—Yes; but the rock cutting at Portna is not in the £25,000 estimate. That was the matter that was under discussion between Mr. O'Neill and me. I read you a report where we conferred together and came to the conclusion that it would be advisable to add to the £35,000 estimate the cutting of 20,000 cubic yards of rock above Portna weir, and that that would make it more certain and safe as to the floods, and that added £10,000 to the estimate.

4282. That made it £35,000?—It did.

4283. Then you propose also to lower another weir lower down?—I propose also to lower Carrone weir and Movinagh weir.

4284. Did the lowering of these weirs also involve the deepening of the bed of the river?—No, not materially, because they are not in a position in which there are bad shoals close to them.

4285. Is the capacity of the river, even lowering the weirs as you propose, sufficient to carry off the floods?—As well as I can recollect Carrone is.

4286. Take them all together?—I think Carrone and Movinagh, but I will refer to the section. I do not think I recommended any cutting at either of these. There is deep water just above for a considerable length; you may seek there. There is the weir and there is deep water just above it for a mile and a half.

4287. And then shallow water?—Then comes about water with a rapid fall, and then the lowering of this would give the advantage of those deep waters.

4288. You propose to lower the crests of the weirs two feet?—I suppose that is the average?—Yes.

4289. And you think that, without deepening the channel we are now speaking of would be sufficient to provide for floods there?—Yes, at Carrone, or at Movinagh, but not at either the Cutts or at Portna. There you would have very heavy cuttings, which are to be done.

4290. They are necessary?—Yes; here is the Cutts weir and here is the Loughness Island, that comes about a mile and a half above it, and there I propose a tolerably heavy cutting, and also at Colmahine.

4291. Is that included in the £35,000?—Yes; I estimated to expend between £3,000 and £4,000 on those cuttings down there.

4292. The cutting referred to formerly was not included?—That is the Portna rock.

4293. From Lough Beg down to Portna?—Yes, I included cuttings at Portloughness.

4294. You mentioned £10,000 as being required in addition?—That was extra; that was after the conference with Mr. O'Neill, and I thought it better to make it certain and get all the advantage we could out of the two feet taken off the weir at Portna.

4295. Then you think that without providing sluices in the weirs for the discharge of floods the simple lowering of the crest of the weirs two feet would suffice?—In those cases; not in the two principal ones at Cutts and Toome, but in Carrone, Portna, and Movinagh. There is very little flooded land in the neighbourhood of those places. Then the question to be dealt with in reference to the delivery of the flooded lands is to determine how far the Lough Neagh will

set as a compensation reservoir, and so limit the size of channels which must be provided in floods. The determination of this question is dependent largely upon the length of time during which the waters of the catchment basin of Lough Neagh continue to pour into that reservoir a greater quantity than the outlet channel can discharge. The waters coming into Lough Neagh sometimes in floods have raised the lake four to six inches in one day, according to the registry. Three inches of rise of lake-water would of itself be 750,000 cubic feet per minute—the mere rise, independent of the discharge. The total water is this quantity, plus the discharge—and as the river at Toome was at the same time discharging, according to its level, from 300,000 to 400,000 cubic feet per minute, the total water coming in has often exceeded 1,000,000 cubic feet per minute. The exit channel to lake 400,000, provided, or rather intended to be provided by Mr. MacMahon, would allow the lake to rise almost every year over the intended flood level. It may be that the channels were sufficient at first. I have not the earlier registers to examine, but from the time I have them, from 1867, every year but one up to 1881 the floods have been over the intended flood level of 48 feet; that is to say, in 1867 the floods rose 1 foot 9 inches above Mr. MacMahon's flood level; in 1868, 6 inches; in 1869, 1 foot 1 inch; in 1870, 1 foot; in 1871, 11 inches; in 1872, 2 feet 6 inches; in 1873, 2 feet 6 inches; in 1874, 1 foot; in 1875, 1 foot 1 inch; in 1876, 2 feet 3 inches; in 1877, 4 feet; in 1878, 3 feet 5 inches; in 1879, 4 inches; and then, in 1880, it was 6 inches under the flood level; that is the one year in which it did not rise over the flood level. Then, in 1881, it was 4 inches over the flood level. After that I do not know what it has been, for my reports were only up to that date.

4296 I gather from you that the lowering the crest of the weirs which you have just referred to, without deepening the bed of the river, would be sufficient to pass 585,000 cubic feet per minute?—Yes, at Carrone I have calculated out exactly what flood line that would come to—that is, the line of the surface of the water in the flood of 585,000 cubic feet per minute, or rather more than that. It would be 585,000 at Toome and 625,000 at Cutts, and I have calculated what a flood would do from section to section.

4297. Have you got those sections?—Yes, they are all marked on that bundle of sections which I have shown you. They go right through from one end of the river to the other—from Toome to Colmahine. The upper line is the flood line, and there is a longitudinal section showing how that runs.

4298. Could you furnish the Commission with a longitudinal section showing the fall of the river in that section of the river with transverse sections at various points to show what the sectional area will be with reference to the flood level?—Yes, I will. The cause of this flood level of Mr. MacMahon's being exceeded every year is probably improved drainage; but the fact is so; and the quantity of water which passed off I calculate as much larger than shown in Mr. Manning's tables at page 10 of his report, which may give the average, but as I will show you do not give a correct statement of the amount to be provided for, and must be largely increased to do so; nor on a higher flood level than Mr. MacMahon's assumed if the lands about Portloughness are to be relieved, as even that level gives a good deal of low land about Portloughness. I agree with Mr. Manning that it is not advisable to provide channels to meet the flood of 1877, but in ten of those fifteen years mentioned—1867 to 1881—the flood was one foot over the flood level; in four of them it was over two feet; and in 1877 it was four feet. It may be said, and has been said, that this arises from accumulations in the river. I have measured those accumulations, as I have already stated, but I have also measured and tabulated the quantity of water that was passing, and the quantity of water that was passing was so large and so immensely beyond that which

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was calculated upon by Mr. MacMahon's report, that I think it important the Commissioners should be aware of this, so that in doing with the question it may not be dealt with upon a false basis, that is to say, upon the idea that 400,000 cubic feet per minute will really deliver the country from floods.

4302. Then you state that if the channels are carried out in the way you have suggested—namely, deepening above Lough Beg and thence to Portin, and leaving the bed of the channel below mostly in its present state, but lowering the crests of the weirs two feet, would provide for a discharge of 585,000 to 600,000 cubic feet per minute and prevent those floods you have been referring to?—Yes, except that of 1877.

4303. That was a 1,000,000 in round numbers?—Some days there was a 1,000,000 cubic feet came into Lough Neagh—not went down the river but came into Lough Neagh. The way I have got at that has required a very intricate calculation, or has involved an intricate question of arithmetic with regard to the registers. We have a careful registry for all that fifteen years, of which I have copies here, of the heads of the water both at Portin and at Portora. At Portora there is no possibility of giving an accurate statement of the quantity of water passing the weir from the registry, because the weir is covered sometimes entirely, sometimes half covered, and according to particular local circumstances it is not always the same discharge for the same height of water. But Portin affords us an absolute means of measuring the quantity of water passing down the river. Portin weir is hardly ever covered at all. In all these ordinary floods the water falls clear, and therefore the height of water registered day by day, and the length of the weir, gives us, as you are aware, the exact quantity that is passing over it. I have taken off one-eighteenth from each of those discharges to get the quantity that was passing at Portin. I have done so, because taking the maps that you have before you in connection with Mr. MacMahon's report, you will see there can be laid off there with fair accuracy, and that about 100 square miles is the catchment basin between Portin and Portora, and therefore there being 1,800 odd miles in the whole catchment basin, it would be about one-eighteenth of the whole. Then, taking one-eighteenth off the quantity passing at Portin, I have approximately the quantity discharged at Portin every day. I have then ascertained what the height of Lough Neagh was each day, and when there was a rise of half an inch between one day and the next, that gave me a quantity additional, equal to for one inch, 250,000 cubic feet per minute. I have added that 250,000 to the discharge when there was a rise of an inch, and thereby ascertained the total quantity of water to be dealt with that day. I have tabulated that out for three of the principal floods, and worked it out from day to day during the whole continuance of the flood, and I have ascertained on each day how much water required to be discharged. I will take one of them and give you an estimate of the figures to give you an idea of it. In the first column of these tables I have the height of the gauge, in the next the water passing over the weir, the next the accumulation by the rise of the Lough or the decrease by the fall of the Lough, and then adding or deducting as the case may be, I get the total amount of water to be provided for each day. Then I deal with that by a table showing how the new channel I propose would have acted each day. I calculate what the discharge would be at every inch of height, and I set down the discharge at the particular height as the whole water discharged down the river. Having ascertained that, I see what the accumulation would be, that is to say how far that was short of the total quantity of water. That gives me the number in decimals of an inch or more than an inch which the Lough would have been that day in consequence of the channel being unable to discharge it if it exceeded 585,000, and by that means I get at how much the Lough would have risen or fallen each day under these circumstances, and

I have registered here what the height of the Lough would be under those circumstances each day of the flood, and in that way I ascertain whether or no I would exceed the top flood which is safe to go up to it; and I believe that nothing short of that, or some such calculation as that, would be sufficient.

4304. Perhaps you will make a copy of one or two of the measurements you have in that book, and I would suggest that the cross section should extend over the head on the margin of the river to each side for some little distance?—As far as I have got them. You do not mean we should go down and extend the levels?

4305. I want to know the nature of the land on each side of the river?—You will get that, to a certain degree, by the sheets which show whether it is flooded land or not.

4306. I should like to refer you a little farther to Mr. Manning's report with regard to the sluices; you do not recommend the sluices in the west?—I do, certainly, at Portora.

4307. But not in the others?—As the Commissioners think it will be necessary there; that is to say it will be there a question very much, of whether the sluices can be dealt with with less cost by lowering the whole affair and leaving it as it is at two feet lower, or by sluicing.

4308. We are speaking entirely of the question of floods. I ask you whether you would recommend sluices in the Ouse?—I think either one or the other. I do not think it matters which you do if you get the same amount or area there.

4309. Then the third is?—Additional excavations should be made at Loughan Island, and the lower parts of the Macanally, Abakerry, and Agnew tributaries should be improved and embanked?—I have included in my estimate a certain amount for those.

4310. Is that in the £25,000?—Yes.  
4311. What amount have you included for those?—To excavations at Loughan Island, and above and below it, 58,750 cubic yards at 1s 4d = £1,917.

4312. You have included that to the full extent recommended by Mr. Manning?—No; he puts it down at a very much larger amount—£12,000. I think. In Mr. Manning's table, at pages 10 and 11, he gives a statement of the months during which the flood exceeded 400,000 cubic feet, and it seems to me as if there were a considerable number of those omitted from that table. He gives certain months when there was a discharge of over 400,000 cubic feet per minute, and rather relies upon those as being comparatively few; but I find that in almost every year there are several months he has not mentioned at all. Between 1847 and 1881 I find it occurring in the following months:—January, February and March, 1857; February, March and December, 1858; January, February, March and December, 1859; January, February, October and November, 1870; January, February and March, 1871; January, February, March, April, October, November and December, 1873; January and February, 1874; December, 1874; January, February, November and December, 1875; March, April and December, 1876; January, February, March, April, November and December, 1877; January and February, 1878; January, 1879; February and March, 1881.

4313. You have not got it later than 1881?—No.  
4314. During all those months it exceeded 400,000 cubic feet?—Yes.

4315. Then Mr. Manning has got?—Fourthly.—In order to moderate the effects of such a flood as that of 1877, and of other exceptional floods of less volume in a greater degree, additional excavation in 1000 should be made above Portin weir, so as to render the increased power of discharge by the sluices more effective. You recommended that work, too?—I certainly do not; I do not advise that at all. Mr. Manning recommends there an expenditure of £30,000 after he has, as he states, efficiently provided for the

discharge of all floods, except such a one as that which occurred in 1877. That flood of 1877 was of a very exceptional character, such as occurs only once in twenty years.

4313. He does not propose to do away with the flood of 1877, but to moderate the effect of it?—He proposes to moderate the effect of a flood occurring once in twenty years, and to expend £59,000 to do it. I do not propose to do that at all. I say it is wiser to go in for what will give thorough good relief in ordinary years, and let a flood like that of 1877 do the damage.

4314. Then you do not think that this fourth work is necessary?—No; I do not think it is advisable. If money was no object it would be another matter, but that is not the case. It is not advisable as a commercial transaction. There is a flood that occurs once in twenty years, and I think it is not at all advisable to expend £59,000 to avoid it.

4315. The difference.—Is £59,000 the difference for that?—Yes; and it is not even to avoid it, but merely partially to avoid it. It is only to moderate its effects.

4316. Mr. Abernethy.—In addition to these works recommended by Mr. Manning, what other works do you suggest?—The only thing in addition since 1881, that has occurred to me, has been this, that I think there ought to be a deep approach made in the Lough Neagh to the weir—above the weir. The great difficulty of the sand coming down from Lough Neagh into the river at Toome will be aggravated materially when sluices are put into that weir, for, at present, the sand piles up behind the weir until it is near the level of the top of it. When you put in sluices, say 2 feet 6 inches deep, you must keep the channel at least 5 feet or 3 feet 6 inches deep behind the weir to enable the sluices to set effectively, and to keep the stuff from coming down in the river to deposit and form shoals. Therefore, I propose to expend an additional £8,000 in making an approach to that weir by excavation in Lough Neagh.

4317. At present, with this solid weir at Toome, the under current is checked, and the sand piles up and forms behind the weir?—Yes.

4318. If sluices were provided by which the under current would have more effect, would that not lessen the tendency to deposit sand behind the weir?—It would carry the sand right forward into the river, and that will then be deposited.

4319. It would not be a question of piling up behind the weir?—I would cut it away from behind, so as not to allow it to go down the river. That sand can be dealt with much more economically before it comes across the weir than afterwards. Once it gets into the river it forms into shoals, especially when going into Lough Beg where the current slackens, and does not carry it forward. It is deposited and shoals up the river. Then you have to dredge it, and there is no place to deposit that except by wheeling it up on the banks, which is comparatively very expensive; whereas, if we dredge it in Lough Neagh, you can deposit it in the deep water in Lough Neagh with bigger barges. You can dredge it in the lough above the weir, so as to lower the weir basin below the sluices as well, and to prevent the sand being carried forward.

4320. Then I think we have exhausted all the works you recommend, and those embraced in Mr. Manning's report?—I think so.

4321. Mr. Barry.—When you examined the river in 1869, you stated that you had considered Mr. MacMahon's report and plans?—Well, the plans were only what were attached to the report.

4322. I am reading from your report—"And ascertained where any deviation had been made from it in the execution of the works?"—That was merely what was attached to the report.

4323. Then you stated somewhere else that you had taken soundings, measurements, and levels?—Yes.

Here is a sheet of sections made at the time. (Producing same.)

4324. Are those Mr. MacMahon's?—No, those were made by me in 1869.

4325. Mr. Finn.—That was the existing state of affairs then?—That was the existing state of affairs, and you see by the red where there is any work to do for the navigation channels.

4326. To produce what?—To produce what was stated in the report of Mr. MacMahon.

4327. Mr. Barry.—I think one may take it, generally, that the only place where you draw attention to the width being insufficient is in Lough Beg?—Particularly.

4328. And that the navigation depth of eight feet was given throughout?—It was.

4329. Are you still Consulting Engineer to the Navigation Trustees?—No. I never had any official connection with them; but I merely, at that one time, made that report, and then was called in merely as an engineer to report again on this late occasion. I have no connection with them.

4330. Then the Commissioners must not take it from you, as an expression of the opinion of the Navigation Trustees, that the depth should be reduced to six feet?—I recommended them not to object to it, that is all.

4331. You are not expressing that opinion officially, but only as an individual?—Yes. But there are some gentlemen here representing the navigation who can state their views. I have my own opinion very strongly about the navigation.

4332. Mr. Manning states that there was little or no complaint of the drainage for something like eleven years, I think?—I think he does. I have no means of giving any information between 1859 and 1870. I did not examine the river during that time at all.

4333. Do you consider that in 1869 the river could have passed 400,000 cubic feet a minute?—I hardly could give you a sound opinion on that, not having measured the cross sections, or dealt with and calculated them; but from what I know now, I should say, it is hardly likely that it did.

4334. Then must we take you as qualifying that statement in your report of 1869, as to your examining the designs of Mr. MacMahon, and inferring that you did not thoroughly examine them, because you say now that you think the depth and width were insufficient?—But my report was nothing to do with drainage.

4335. But I think you state you have examined the report and plans?—That is of the navigation works—of the weirs, locks, and navigation channel.

4336. What is the difference between the navigation channel and the drainage channel?—The navigation channel merely referred to the question whether there was a channel eight feet deep carried through all parts of the river, to enable boats drawing that water to pass and return.

4337. Did not it mean eight feet—where Mr. MacMahon showed eight feet?—Quite so, and I did examine that.

4338. And there was eight feet?—There was eight feet, and I made those cross-sections to show it, and ascertained whether there was.

4339. And was there the width shown by Mr. MacMahon?—The width shown for the Navigation Channel.

4340. There was only one channel shown, was there, except in places?—In places where it was required for drainage in all the heavy portions of the work between Portora and Toome there was a huge width shown and deep cutting—150 feet to 180 feet—according to the size of the channel. All I had to do was to see if there was sufficient for navigation purposes.

4341. You only looked to see that there was a specified depth for a specified width?—That is all.

4342. What was the width?—I think it was 60 feet.

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4343. At the surface!—No, at the bottom—I think it was 50 feet at the bottom, but I had better not speak from memory. (Reading from section).—"Bottom width of channel, 60 feet, as per Mr. MacMahon's report. Bottom width of channel, 50 feet; bottom width of channel, 36 feet; and bottom width of channel, 40 feet." It was a different width in different places for the navigation.

4344. Then when you came to examine in June, 1881, did you take the whole width of the river for drainage and for navigation?—Yes.

4345. And it was upon that that you based your report of 1881?—Yes.

4346. Now, did you look at it from two different points of view in 1859 and 1881?—Yes; in the one it was to ascertain what the whole channels were, and how far they were not originally cut or filled up.

4347. May we take it now that, having given the question a good deal of consideration, you consider that for £38,000 spent upon the river you could realize a discharge of 585,000 cubic feet per minute?—I do. I would say £40,000, because I have put down £2,000 for contingencies.

4348. Mr. Abernethy.—Was the navigation simply. I understand you to say that the navigable depth at the present time is eight feet?—As it was formed originally.

4349. It is now?—I think it is now, but there may be some shoals.

4350. What would be the effect on the navigable depth of eight feet if you lowered the crests of your weirs two feet during the summer months?—It would be to bring it down to six feet, and it would bring down the whole navigation level to six feet; but the reason I considered that quite sufficient was that the other navigations which come into Lough Neagh, and which are twenty times the importance of this, have only six feet.

4351. Then, in fact, the lowering of the weirs does involve the lowering of the depth of the navigation from eight feet to six feet during the summer months?—Certainly.

4352. Mr. Barry.—Do you consider there is any difficulty in a vessel drawing from five feet to six feet navigating Lough Neagh with safety?—I can hardly tell you absolutely about that. The trade has never been sufficient from one port on Lough Neagh to another to really develop a proper mode of steam towing. The only trade of any importance, I believe, has been that to Coal Island, and I am not sufficiently aware of other circumstances to say whether there would be any practical difficulty, but I do not anticipate it.

4353. Or else you would not have recommended the lowering of the weirs?—The lowering of the weirs does not affect that at all. All the navigation across Lough Neagh is between navigations which at present have but six feet, and I do not propose to lower Lough Neagh an inch.

4354. The Chairman.—You do not lower the weir at Toome?—Not an inch. I do not think it will bore it at all. I think it might affect those upper navigations most seriously.

4355. Mr. Barry.—The reason I asked the question was that there was some evidence given that Lough Derg, on the Shannon, could not be navigated by vessels with a less depth of water than seven or eight feet, and that it was necessary to have a much greater navigable depth in the Lough to ensure safety.

There is a heavy sea on Lough Neagh occasionally, I suppose?—I have not the experience of the navigation of the Lough to state that definitely, but whatever it is it exists at present, and what I am proposing does not alter it, because this is merely to lower the depth on the Lower Bann River.

4356. Mr. Abernethy.—The navigable channel through Lough Neagh is only six feet?—That is all.

4357. Mr. Finn.—Is there any obstruction to navigation between the Cutts and the Bridge at Coleraine at present?—I think it is quite up close to the Cutts that there is the beginning of it. There do not seem to be any shoals until you get quite close to the Cutts.

Captain Given.—Perhaps as Mr. Graham is here he might give some answer to your question as to the navigation of the Lough, and of the depth of water required for the navigation of Lough Neagh. He lives near and sees a great deal of it.

Mr. Graham.—It is merely with regard to the remark about being able to sail on Lough Neagh, and the capacity and the sailing power on it. Lighters go down the Lough and the Newry, and their average tonnage is from 60 to 70, and in moderate weather they can sail from Ellis's Cut to Ball River—that is a distance of 20 miles. These are sailing lighters, and it was only these sailing lighters, till within these last ten years, that the Lough Navigation could get a steam tug for; but there are no others, and except there is tremendous stormy weather nothing would prevent a sailing lighter going to Portadown or Coal Island.

4358. Mr. Barry.—What is the draft of the vessel Mr. Graham?—Five feet six inches.

4359. Mr. Barry.—These are the lighters?—Yes, and four feet six inches. The lighters loaded from sixty to seventy tons draw that much water.

The Witness.—There was a point mentioned by Mr. O'Neill this morning that these gentlemen are anxious to state their view upon, and that is with reference to the encroachment on the river. You asked him several questions as to where these encroachments had occurred. Mr. Graham can give you evidence about that. He is the superintendent of the Lower Bann Navigation, and his business takes him constantly up and down the river.

Mr. Graham.—I think Mr. O'Neill was liable to give a false impression when he led you to believe that the banks were encroached upon for fifty feet in several places. I can assure you from personal observation that such is not the case. In fact, it is the reverse, for the banks are washed away by the current in place of being encroached upon.

4360. The Chairman.—That is the case with the banks of almost all rivers. They wash away in some cases and deposit on the other side, but you say it is not accurate that people have encroached fifty feet.

Mr. Graham.—No.

4361. The Chairman.—Have they encroached thirty feet or forty feet?

Mr. Graham.—No, one foot; and any sediment that falls on to the banks is washed away.

4362. The Chairman.—Mr. O'Neill is going to give us particulars of the places where these are, and the extent of the encroachment.

Mr. Graham.—Will you please to hear that in mind, because I can certify it to be a fact.

The witness withdrew, and also the gentlemen representing respectively the Lough Neagh Drainage and the Lower Bann Navigation Trustees.

Mr. John  
Grey Vealey  
Foster.

Mr. John Grey Vealey Foster called in and examined.

4363. The Chairman.—I believe you reside at Bellefleur, County Fermanagh?—Yes.

4364. I have laid before the Commission your letter to myself, dated January 11th, and the Commission have discussed the points raised. We feel that we can do nothing as regards your request to be furnished with a letter to the Board of Works. That is quite

outside our province?—To the local board at Ennis kilen.

4365. Either to one or the other. We have no power to do that. All we could do would be to ask certain persons to come and give evidence, and bring certain documents; but it is not necessary for your purpose that we should do that, and I fear we should

not be able to comply with your request; but inasmuch as you mention here certain things connected with navigation, and which affect arterial drainage, we should be glad to hear anything you have to say if you will make a statement.—I should like to put in evidence the documents that I sent to Mr. Abernethy, and I cannot make it better. I may put it in a few words now also, but I should like to put that in evidence, and also the letter I wrote to you on the 11th of January, which is in this paper. [The following letter was handed in].

"Shelbourne Hotel,

January 11, 1867.

"Sir—

"The persistent struggles of the Board of Works and their drainage employers in London, the Treasury Commissioners, to hide and screen these gross mistakes, and their false certified certificates of the Ballinacorney canal in 1850 as a failed work, all to prevent the consequent claims for redress and compensation, are the whole cause of their countless attempts ever since, first to prevent, and then to spot, and now to curtail and cut down, the Lough Erne works, because they must lead to their exposure.

"On November 13, say two months ago, I sent by good professional advice fourteen documents to sustain these views to your colleague, Mr. Abernethy, and added that I would give any further statements in my power, if required, and Mr. Abernethy kindly wrote to me that he would lay them before you; and as I have now come to Dublin for the final settlement with my counsel on the 18th of my affairs to get a mandamus from Queen's Bench for the Lough Erne Board at Enniskillen to give me a copy of Mr. Richard Russell's opinion of the state and progress of their works, after his examination last June (a document that should in no case be suppressed from the various public interests concerned)—and also to let me, with an accountant, examine the books in their office, with a view then to recover some compensation for most gross and deliberate mismanagement—from the Treasury £50,000, from Earl of Erne (for his father and himself) £20,000, and from three Orange M.P.'s who quite neglected their duty £10,000, which £100,000 to them would be only a small rebuke to the Lough Erne counties for the loss for twenty-six years of canal income to the western and eastern coasts of Ireland, and for keeping also Ireland's canal system broken into two pieces; therefore I now ask if you will save me, as the sole promoter of these works (see their Act of Parliament), the cost and trouble of this new law suit, and will order these facilities to be given to me.

You are lately appointed to promote arterial drainage in Ireland, but since 1867, a long time, I have spent my private thoughts and money to every, and successfully, the largest work of this kind in all Ireland; and it is shameful that the Treasury Board have been always bitterly against me, so that I have been compelled over and over again to apply to courts and lawyers, and in 1861 to a Select Committee of House of Lords, every one of whose five independent peers agreed with me, and thus saved these works.

Small farmers are condemned from morning to night for yielding to bad advice, and opposing the laws of the land—their families are at stake. But how ten times more scandalous it is to see how paid commissioners for twenty-six years can in Ireland use tricks of every kind with impunity against the well-meaning laws which they are bound, and ought honestly, to carry out!

Please let me know to-morrow if you will order the local board of landlords' readiness to show the state of their works and accounts, as above? But whether you agree or not (this letter will, in next *Ireland's Gazette*, show how a small landlord is persecuted and crushed in Ireland by Ireland's present misgovernment, who tries to give fair play to her natural resources.

Your obedient,

J. G. V. PORTER.

To Sir James Alport, &c., &c.,  
Chairman of Royal Commission.

If you will allow me to say so I feel myself very responsible to many interests in the country, having been the sole promoter of these works; and I think you can understand why I feel myself very responsible. Many interests supported me—the Grand Jury of Fermanagh and many of the landlords and tenant farmers, for many years, against very violent opposition, which, by degrees, culminated in 1850 in the required majority of assents for the Lough Erne Act of 1850, in which you will see I was the sole promoter

of those works, and I hope you will consider it reasonable for me to feel myself bound to try and get those works carried out in accordance with the expectation of benefit held out to the landlords who gave their assents.

4358. I presume these works had reference to navigation?—They are combined. They are not separated neither in nature nor in finance, nor in law. They are combined in the Acts of Parliament in very many matters, and combined by nature.

4357. Both the drainage and the navigation?—Yes.

4358. Will you let us have your statement?—I cannot put my statement better than in what I sent to Mr. Abernethy. I can stand to that statement, and also my last letter to you. If you will allow me, I should like to explain to such competent Royal Commissioners as I am now appearing before, the way in which these two works are united; because it appears strange at first sight to many people how drainage and navigation can be so united. It is the drainage of the great shoals at different places in the fifty-two miles from Bellebarbet through Enniskillen to Belleek, lets off the water which otherwise used to flood over 17,500 acres almost every winter, and sometimes carry off the crops in August, or prevent the cultivation in spring. Then, on the other hand, there are great sluice gates put up at the outfall at Belleek, where there is an ample outfall, and these sluices keep up, or are intended to keep up, the water for the navigation. It is in that way that the drainage and the navigation are combined and united. I have here the documents that I thought would throw light upon the matter. Would you allow me respectfully to call attention to this pressing point with reference to this particular matter, that the Lough Erne Act of 1850 was passed to confirm the provisional order of the Board of Works in pursuance of Mr. Thomas Hawkesley's report? That Act gave from the 1st of October, 1850, to the 31st March, 1855—four years and a half to complete the works. Then the powers of construction expired, and the Commissioners of Public Works in Dublin, the agents of the Treasury in London, having power under the general Act to extend the power of construction for three years, did so. These three years will expire in March, 1858. So that there is only one summer, namely, the summer of 1857, now to allow of the completion of these works. And I believe firmly—I have a most certain knowledge—that Mr. Russell's report that I have tried to get is to the effect that even this extension of three years added to the four and a half years, which that excellent judge, Mr. Thomas Hawkesley, thought amply sufficient, will not suffice to complete the works, so that there will be another Act of Parliament required. As I have said, there is now only one summer, namely, the summer of 1857, under the legal power for these great works to be completed, and therefore another Act must be passed. I wish to take every precaution to prevent either the curtailment of the works in order to meet mismanaged finance, or the curtailment of the navigation which was the whole public benefit promised by the works: the drainage of the flooded lands being, as has been always considered, and very justly, a private benefit to the owners and occupiers of the land. The navigation is a remarkable navigation, for 52 miles without a lock, and it is unique in the whole United Kingdom. That is the public advantage, and there is every attempt now made to get rid of that public advantage although it has brought £30,000 of free grant to these works. That is a reason why I take the liberty of trying in every manner to get Mr. Russell's report, and the power to examine the office books.

4359. What money has been spent altogether upon the fifty-two miles?—That in what I want to get at. I appointed the Board in the first instance. I appointed myself at first, because I had had many differences with Lord Erne, one of the landowners. Then the Government thought that the Board should not be without me; and then I made a new Board which is almost the present Board. Only landlords could be members

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 Mr. John Gray  
 Vice-President.

of the Board. They must be landlords of the flooded lands. My time at the board was from October, 1880, three years, and I did my very best with the Board, which consisted of gentlemen by whom I was well known, some of them relatives of mine, and landlords of the country. But I was not in the least degree aware when we first began in October, 1880, that there was already prepared and arranged the Treasury Bill to come on in 1881, which, if it had passed as it was drawn by the Treasury, would have upset and stopped the works altogether. I was examined before the Committee of the House of Commons with Mr. Hoins, then a Lord of the Treasury in the Chair. They would not make any alteration. I was obliged to again appeal alone. I should not like to go behind the scenes, but you are not aware of the immense amount of local opposition there was from a number of landlords to these works. Then the Commons Committee passed without change this Bill proposed by the Treasury, who are the employers of the Board of Works in Dublin, and therefore they may be taken and ought to be taken together. Then I was obliged to consult lawyers and agents in London as to what would be the best course to take, and I said I would, as a very last course, appeal to the House of Lords. Mr. Pembroke Stephens, my counsel, and Mr. Cameron, the manager of Messrs. Sherwoods, strongly recommended me not to do so; that I was not aware of the risk of one man alone appealing to the House of Lords against the Board of which I was a member. I said I had spent years of my life, and many thousands of pounds in trying to alleviate the most terrible sufferings and losses of agricultural produce in the country round about me and I could not bear to see all this time and money lost, without making any attempt. So I asked these two gentlemen, Mr. Pembroke Stephens, and Mr. Cameron, who was quite conversant with this matter to be good enough to take home with them some papers. They were very satisfied on the subject, and strongly recommended me not to go on, and indeed almost refused to have anything to do with it. However, they took these papers home and read them, and then said it was a frightful case; whereupon I appealed to a Select Committee of the House of Lords, and after two days of inquiry, the five Peers unanimously struck out the clauses to which I objected. You can compare the printed Bill of 1881 with the Act of 1881 which was passed, which will show you that. What was done?—The Government, by some extraordinary influence, got this Bill recommitted, as they call it, so as to endeavour to get the Peers to change their minds. They had the very best counsel they could get, and the whole question was argued again, but the Peers would not change their minds. Lord Waverley was their chairman, and there was also Lord Broadbent, Lord Raglan, Lord Leven, and Lord Tenterden. You can see from that the kind of opposition which was made to these works; and if those five Peers had not struck out these clauses, which you can all see for yourselves, the works would have been altogether upset, and with Lord Orliston, now Lord Emsay, urging us at the Board to let there be a clause for compensation for what little money had been spent, and then to give up the whole matter.

4370. Can you tell us what state the works are in now?—They are in a very bad state indeed. I hope I am not trespassing upon you, in saying before you what I have stated. The pith of the question is what ought to be laid before you.

4371. What percentage of the works is completed?—10 per cent.—I have no means of saying, but I am trying to make myself as well acquainted as I can with it, I should think there would be an excess of outlay before they are finished of £150,000.

4372. What was the total capital originally?—The total estimate was £200,000, increased by interest to about £200,000, speaking in round numbers. That was Mr. Hawkesley's estimate, and I think it will

be two and a half times as much as it ought to have been.

4373. Have you been over the works and seen them lately?—Yes, over and over again.

4374. What state are they in now?—The sluice gates, which you would have seen at Belleek, and the cutting of the rock there, where there is a great dry fall, and four very great sluices, are well done and quite finished. That is the outfall. There are four gates there. They are on the plans of Mr. Price, but the gates are put in by Mr. Stoney. They are finished, but the great delay in the works is in the dredging for say five miles, from Belleek up to Rosseroe, which is the end of the lower lake. I could not say what, but a large part of that is not done, but Mr. Haslam's report, which was made in June last, when he saw it, would tell us at once. But there is a large part of that still to be done, and it is that that is keeping back the works, for it will be the last done. The upper works, from Enniskillen to Collarney, with different little branches at the mouth of the rivers, are let to a Scotch contractor for £37,500—a Mr. Best.

4375. Is he doing anything?—He has done a great deal—he has put in the new bridge at Enniskillen, and has taken away the old bridge of three arches of thirty-five feet, and put in one with two arches of seventy feet. My life at the Board had been one of repeated protest. At the end of 1884, I thought it better for myself and the Board to retire, because I could not get inquiry from the Board. I wanted to have a substantive inquiry.

4376. The duty of the Commission here is to inquire into what is necessary for the arterial drainage of the country. I do not think that we could do anything as regards your complaint of the works not being carried out properly; I think we have nothing to do with anything that has been ordered by the Board of Works or by the Act of Parliament. We are simply to report our view of what is necessary to be done to facilitate the arterial drainage of certain districts.

May I ask if it comes within your province to suggest that the complete plan approved by Mr. Hawkesley should be carried out?

4377. Mr. Pim.—The works are now proceeding?—Yes.

4378. There has been no stop in the works as yet?—No; and I believe they are applying for money.

4379. What is it that you are apprehensive of occurring?—They have not got money to finish the works as designed; they have outspent the money and outspent the time, and there must be a new Act, which was never expected. What I am apprehensive of is, that in order to meet the reduced money there will be a curtailment of the works and a giving up of the navigation. Just remember how important the navigation is—it is the communication between Lough Erne and the sea ports, both for the west and east coasts. Does not that come within two of your four classes of instructions; because it appears to me that one takes in drainage and the other takes in harbours.

4380. What have you to suggest we should do at the present stage, because that stage has not yet come about. What do you propose we should do?—Could you not publish Mr. Haslam's report, he is a very eminent engineer, and he carefully examined these works in June, and his report would answer most of those very proper questions which Sir James Alport has put; that report has been suppressed.

4381. To whom did he report—who appointed him?—The local board for Enniskillen employed him to examine the works, and especially those immense dredging works from Rosseroe through five miles to Belleek; he spent a long time there, and made his report to them so far back as June last year.

4382. Are you now a member of the board?—No; they kept me on a member against my will, but I have retired; I have told you exactly what I am; I said at

the end of 1884 I would not attend again unless they would allow an inquiry.

4383. They have made this inquiry?—But that was not the full inquiry; they made that six months afterwards, and then kept it back; what is the use of the inquiry if it is kept back.

4384. To whom do you wish to have that inquiry published?—I think it should be published.

4385. So that the contributors to the cost of the undertaking should know the position of affairs?—There are no contributors at present; the money is all advanced on works, and then when the works are passed there will be an assessment on the landlords, and it is only the landlords who have signed bonds under the Act of 1863; then they have power to charge the tenants of those flooded lands.

4386. The Chairman.—If you will kindly send me copies of the papers you have referred to, I will read them over. You say there are some other papers you want to supply?—There are two papers which I have here, and which I shall be glad to hand in, because I think they would enlighten you on the way these works are done in Ireland. [Handing in the same.] One of these is dated June, 1885, and is an examination by an accountant in Dublin, and you will see his opinion.

4387. The Chairman.—I will read them over, and the Commission will consider whether they can call upon Mr. Hamard for a copy of his report, or go into the question of what is being done. The Commission will consider it very fully, and the secretary will be instructed to communicate with you?—It is not for myself, by any means, but it will be a lamentable thing if these works are not carried out, as they were so carefully designed. I suppose no works were ever better designed. I have been recommended to apply to the Queen's Bench again, as I did in 1873—the Commissioners of Public Works would have stopped these works then, and I was obliged to apply to the Queen's Bench, and they would not allow it—and as the basis upon which to get the compensation that I have been awarded to apply for Mr. Hamard's report, and liberty to examine the books in their office. With regard to that pamphlet I have handed in I have been very careful, and I have not been to that gentleman, but he is an accountant in Dublin, and you will see what he thinks of the way the accounts were kept in that office. I hope you will try and get Mr. Hamard's report.

The Chairman.—We will consider it, and see if we can call for the report.

The witness withdrew.

Mr. William Beekin called in and examined.

4388. The Chairman.—I believe you reside at Castleblayney, County Limerick, and are the secretary of the Mullingar Drainage District?—I am.

4389. Will you proceed at once to make your statement to us with reference to that particular drainage district with which you are connected?—There are one or two other matters I should like to refer to.

4390. We shall be glad to hear anything you think it necessary to remark upon connected with that drainage district, and with regard to the paper which has been sent to you?—This drainage district was formed in 1875 through my instrumentality. It is about nine miles long, covering a large area. The works were very large, and required the expenditure of a great deal of money. The first contract was £13,000 for the river, and about £700 for two bridges, which the county repaid so far; but ultimately, before the works were done, the expenditure reached the sum of £38,000, which I think, being the originator and the secretary, and taking a great interest in it, was altogether caused by inaccuracies and defects in the law relating to drainage. The Government Arbitrator sent down by the Board of Works was a Mr. Flahburn, who is now dead, I am sorry to say, and the several owners along the line of the river were not satisfied with his award for the lands taken. The consequence was that in two cases they traversed the award before the Judge of Assize, and in one case one man, who was outside the district altogether, or at least partially outside it, got a verdict for £600, whereas a sum of £25 would have recompensed him for the damage actually done, because I was on the lands myself, and estimated them.

4391. Was that given by a jury?—Yes, by a jury; and juries of course are very unreliable at the present day in Ireland. For the amount of that traverse we had to get £1,000 extra when paying for it as the drainage district to the Board of Works. Then there was a second case of £700, obtained in a very messy way, but being in the hands of a jury they rejected the drainage district again. Then there is a third one going on at this present moment, with reference to a bit of land not bigger than this room in which we sit now, with a labourer's cottage upon it. This man solicited a jury—he did not satisfy the judge—that our works above drove the water down in such a volume that it nearly carried away his house. His house is standing there at the present moment, and there has never been anything done to benefit the

house with the money he got from us. And now, actually in respect of this very bit of land, I got a notice to-day—as secretary of this drainage district—requiring us to recomp him for the loss of last year's crop of potatoes, which he says covered that bit of land, which, as I have said, is about the size of the room in which we sit. There are all defects in the law which, from my experience, I think, if there is to be any addition to the Drainage Act, ought to be taken into consideration. When this occurred it was when poor Lord Frederick Cavendish was alive, and I was in communication with him, pointing out, as your secretary knows, these defects, and there was an addendum put to the Act for the purpose of enabling us to make works outside the district, but in drafting the section Judge Lawson forgot one particular part of it which was with regard to how the money was to be paid, and he left it open in such a way that they make us pay for anything that is done below. It is the case of the dog in the manger. They derive the benefit, but they contribute nothing.

4392. Have you considered what tribunal you would prefer to that of a jury?—I would prefer the Board of Works.

4393. You have no appeal, I think, from a jury?—There is no appeal. If you would allow me to make a suggestion it would be simply this—that in order to avoid any such inconvenience as that to which we were subject, if the area was farmed, the Board of Works should decide whether it is a proper area or not, and not leave it to any set of gentlemen to say what it should be; that they should inspect and decide upon the area, and make it compulsory then on anybody coming in to assist in any works below, which they might ask us to perform—that is in proportion. We should not want more than was right from them, but I would suggest that it should be compulsory on them to assist in repaying the loans and helping us to pay the interest upon them. That, I think, is absolutely necessary for the purpose of forming any further district in this country. I do not see how they can be carried out if that is not done.

4394. Mr. Pies.—Would that get rid of these compensation cases?—I think it would; and that is my object in suggesting it.

4395. The Chairman.—We have had considerable evidence with reference to the alteration of the constitution of the boards, and also as to the extension of the districts of the boards, so as to embrace the whole

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Mr. John Gray  
Vasey Foster

Mr. William  
Beekin.

Jan. 15, 1867  
Mr. William  
Gibbs

drainage area of any given river the Shannon for instance. We have had very considerable evidence on that point, and I do not think we need trouble you to go into that. That is my experience as far as it is concerned, and so I originated this week myself, against the wishes of a great number of proprietors, and carried it out and obtained the Act, and have worked it ever since and lived in the middle of it without having a particle of interest in it myself. I felt that in any evidence I should give you I should like to mention that fact. Then, with reference to the arterial drainage, I consider that most necessary, and without these catchment basins into which rivers empty themselves, the people for distances outside which are never taken into the area could not drain their lands or farms; therefore it is necessary to have the basin before they can drain at all in the county of Limerick. It is absolutely necessary. Then in improving the district we took in 3,250 statute acres. That was all meadow land which was formerly waste.

4395. I see in your district the land improved in value amounts to about £200 a year, and you have spent, with interest, about £23,300!—That is about it.

4397. The cost per acre is £9 4s. 1d., but the increased value per annum per acre is only 5s. 8d. 1.—The increased value differs in the paper that I have here. The improvement varies from 3s. to 18s. an acre.

4398. Probably so, but the average would be what I stated.—I suppose it would.

4399. You are confusing your remarks to the Mulkear drainage district.—Altogether; then one of the questions you ask in this paper is about the effect on the climate. I think the climate is greatly improved, and, with reference to the rateable value, 3s. to 18s. per statute acre is the extra value put on by the engineer, upon which this loan was made.

4401. Do you agree to this return—average valuation 5s. 8d. per acre?—I have not taken the whole together, but I have taken the accounts in my hands, varying, as I tell you, from 3s. to 18s. per acre improvement, on which the loan was levied.

4401. The entire improved value per annum upon the 3,250 acres is £925 2s. 11d., and that works out to 5s. 8d. per acre.—That must be right. Then I do not think that the drainage of the district has been sufficiently taken advantage of by the tenants, for one simple reason, that I consider the time of the loans too short.

4402. That is thirty-five years?—Yes; I believe that if they were extended, and the principal and interest were to disappear at the end of, perhaps, forty-five or fifty years, or something like the time given by Lord Ashburton's Act for the repayment of the purchase money of land, they would be more approved of by the occupiers, and more taken advantage of.

4403. That is at a rate of interest of 4 per cent. per annum?—Whatever it might be, to be determined on by you. I think it should be extended, and I am sure if that was the case, the lands in the county of Limerick would be greatly benefited, and it would tend immensely to the contentment of the occupiers. But there is one thing recommending that which I should certainly draw your attention to, which is this. At the present moment there is a case on a property in this district, where the former rent was £330 a year for a farm. It is a property which I managed, so that I am speaking of facts. The Land Commissioners who sat, reduced the rent of that farm to £220. The reason for the £330 rent on this farm was in consequence of the Board of Works putting on that farm, for the benefits derived from this drainage, a sum of £120 a year. The late Sir Edward Sullivan, who was the Chancellor at the time, ordered an appeal against this decision, the property being in the Court of Chancery, that reduction appearing to be excessive. There was an appeal. They did not give their decision; but it went before them, and there was a special counsel sent down within this last twelve months on the part of the late Chancellor, Lord Justice Stirling, to argue the question as to whether this was pasture land or agricultural land. You can easily

imagine that where land has been covered with water for hundreds of years, when the water is taken off it is nothing but pasture at the time. This decision was before the Judges of the Land Commission in the month of April last, and they have not yet given any decision. They sent me a notice within the last three months, and stated that they were going to propose a case to place before the Court of Exchequer, but over now this case has not been determined—it is still pending. The difference in value is worth about £7,000 to the estate, but they have not decided it, and could not, or would not decide it, although the tenant herself, a woman, admitted to them that it was pasture. If this case goes on, which will be, I think, a guide for all such cases, it will have to go to the House of Lords, except the present Judges of the Court of Exchequer here decide the case. The Land Judges do not seem to be able to manage. It is too much for them; but as I say, it has not yet been decided, and we have been in a state of uncertainty in consequence of this for the last three years. That is a matter that I thought might be interesting to you to know.

4404. Mr. Pitt.—How does the question as to its being pasture or tillage land affect the matter?—Because the pasture lands cannot be taken into the Land Court for the purpose of having the rent revised. It is a curious fact, but it is not decided yet, and the tenant owes me £1,000 rent, which she says she cannot pay until this matter is decided, and we shall be kept in a state of uncertainty until it is decided.

4405. The Chairman.—We have had a good deal of evidence with reference to the alienation of the constitution of these Drainage Boards. Do you think that, as the land owners have now no interest in the question, and are not likely to apply for Drainage Boards, the law should be altered so as to give the occupiers the power of forming Drainage Boards?—Certainly not.

4406. Would you still keep it in the hands of the owners?—I would.

4407. Can you expect the owners in the present state of the law, since 1831, to move in the matter of making new districts?—I do not expect that the present owners of estates will move in the matter at all except the law is extended.

4408. Then if drainage districts are to be formed it will be necessary, will it not, to give the occupiers the power?—I do not think you would ever get the occupiers to do it.

4409. What would you do?—I should let it remain in the hands of gentlemen interested in it, all living in the neighbourhood.

4410. Supposing they will not move in the matter?—You must form a Board; but I should certainly not put it in the occupiers' hands. If you do that you will have corruption and robbery, and everything else, as soon.

4411. Who is to pay for the Board in the first instance?—The occupiers.

4412. And the owners?—I would not make the owners do it. I am perfectly distinct on that point. I would make the occupier pay, and allow him to deduct whatever rate per cent. he ought to pay from the owner in the payment of his rent.

4413. Would that be a deduction from a judicial rent?—From any rent at all that may happen to be upon the land.

4414. How is the land owner to be recompensed his self?—He has to pay at the present moment a portion of that.

4415. Then he has the power to raise his rent accordingly?—He cannot raise his rent. When the judicial rent is fixed he cannot raise it for three years.

4416. Are you likely to get the landlords to move in forming a Drainage Board in any such circumstances?—As I tell you it is very difficult to make them move in any case. I was not a proprietor at all in the Mulkear district, and I moved simply because I saw the waste and destruction on these beautiful lands for six months in the year.



4417. How long has your Board been in operation?—Since 1873.

4418. That was before the Land Act of 1881, which has so completely altered the relations between owner and occupier?—Yes, it has indeed.

4419. I want to know what your views are as regards settling any machinery in motion to form these Boards?—Well, it would be a very bad thing to rely upon the occupiers. I will give you an instance which has happened upon two other estates. I happen to be chairman of another District Drainage Board in the county of Limerick called the Camogue Drainage, and I borrowed money myself from the Government in 1881, I think it was, when money was lent over here for drainage purposes at a cheap rate, and then I went to these estates myself, having the money in my hands to give them, and they would not take it. They actually refused to take it, though they asked me to get it, and I had to return it to the Board of Works, and pay it back again.

4420. Mr. Pim.—They preferred allowing their land to remain undrained to making use of this loan?—Yes.

4421. With the Land Act of 1881 in existence, do you think that if you were to-day attempting to start this Mulkear District you would succeed in getting the landlords to join in it, though you succeeded in 1873?—I succeeded then because the rents were regularly paid, but now it is a strike against rents in every direction.

4422. Have you any suggestion to make as to changes in the law?—If the formation of districts is to be left with the owners I think that the tenant in occupation should be made to pay a portion of the cost which we have to pay in repayment of the interest on these loans. The owner is obliged to keep up the maintenance, but the occupiers do not take

care of their lands. They allow everything to go to the dogs. There is a case which came before me as a magistrate, yesterday, from which it appeared to me that there is a little provision in the Act of 5th and 6th Victoria, chapter 58, section 58, that ought to be added to the law relating to all drainage districts to enable magistrates at petty sessions to oblige the tenants in occupation of these lands that have been benefited to take care of these, which they do not do.

4423. The Chairman.—Probably that would be remedied if there was a change in the constitution of the Board, by giving the Board of Works or some central authority, power over all the drainage districts in Ireland?—I think the Board of Works are the only people in whom you could confide the protection of these districts. I do not think there is anybody else except the local people, who are the owners; and according to one Act, the proprietors are obliged to hold a certain portion of land to be able to sit on that Board, to look after each district.

4424. We have had evidence to that effect, and you agree with that?—I certainly do; no doubt of it. These traversers that took away such a quantity of money from the Mulkear drainage district were actuated, not by any proper motives at all, but by motives which were anything but what was fair and just; and I was told by a Judge who travelled with me that it was an oversight on the part of Judge Lawson altogether in not making outside portions of another district subscribe to, or assist in, the works they asked us to do. As to putting the control of the districts in the hands of the occupiers, the Government may as well keep the money in their pockets.

The witness withdrew.

Adjourned to tomorrow, at half-past ten.

Jan. 14, 1887.

Mr. William  
Droghda

## TWENTY-FIFTH DAY—FRIDAY, JANUARY 14TH, 1887.

Jan. 14, 1887.

36, MARKS-SQUARE, DUBLIN.

Present:—Sir James Allport (Chairman); J. Abernethy, Esq.; J. W. Barry, Esq.; J. T. Pim, Esq.

Sir John Ball Grove called in and examined.

Sir John Ball  
Grove.

4425. The Chairman.—I believe you have had more experience than most people in the valuation of land for rating purposes in Ireland?—Yes; I have been a long time connected with the subject.

4426. You are probably aware of the object of this Commission as regards the drainage of lands in Ireland, more especially with reference to the Bann, the Shannon, and the Barrow, and we should be glad if you would favour us with your views as to the increased value to be put upon the lands. Taking the Barrow district first, assuming an efficient system of drainage were carried out, what area should be taxed to pay for it, and whether you would confine the taxation to the lands benefited and improved, or extend it to the whole area, or, further still, to the entire of the catchment basin, amounting to some 497,000 acres?—My view is rather opposed to taxing the entire area. There is a great deal of that head—a fourth of it, as well as I recollect, which is bog land, and a portion of it is high mountain, and I should not be inclined to put a charge of sixpence an acre, or whatever it may be, over the whole area. I would confine it. Perhaps it would be too limited an area to put it upon the actually improved land, because there is no doubt the drainage of the land will affect the land to a certain distance beyond the actual area of the land improved. The temperature, to a certain

extent, will be improved by it, and it should be probably extended a little beyond the area actually improved, which, I think, is about 46,000 acres. The increased value is estimated at £10,000 a year, and including the towns, the assessment would be £11,500, but I am certainly not inclined to tax the entire area.

4427. We have had it in evidence from several witnesses that the cost of the whole scheme, as proposed by the Board of Works, and by various engineers, will be close on, to, if not more than, half a million of money. If the improved value of the lands is only £10,000 a year, it is clear that it would be folly to spend half a million of money?—Quite so, and I quite agree in that. It would not pay at that rate.

4428. Several witnesses have spoken to the benefit that would arise to the whole district, and further to the fact that the higher lands, particularly if thorough drainage is adopted on them, would throw the water on to the low lands and flood them much quicker and more heavily than they did before, and that fact some of the witnesses have said justifies a taxation being spread over the entire catchment area. I should tell you that one witness is rather emphatic upon it, and divides the district into three zones—the some most benefited, the middle zone not so much benefited but still relieved

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of fog and the temperature and climate improved, and tidally, the higher zone, which he puts at a smaller rate, justifying his view, on the ground that the water from the higher lands is thrown more quickly on to lower lands than formerly.—There is no doubt, of course, that if the lower lands are relieved the upper lands will send down the water more rapidly; but, at the same time, I do not think the upper lands will be benefited at all, and it is simply on that ground that I do not approve of taxing the whole area. I think the improvement would be imperceptible beyond a certain elevation, say twenty feet over the area to be drained.

4439. Would you extend it beyond the lands more immediately benefited?—I think we might go to an elevation twenty feet higher than the actually drained land.

4440. Do you know what average that would cover?—No.

4441. Perhaps you will kindly let us have that information?—I am afraid it would not be possible to do it.

4442. Mr. Abernethy.—Another view of the matter is this. If you regard the river as a great arterial drain for the whole catchment basin, all parties within that catchment basin are interested in the preservation and maintenance of the river?—Yes.

4443. In that case, seeing that the thorough drainage carried out in the high lands and middle lands, above the low lands, brings down the water much more rapidly into the river, and most likely would increase the cost of the maintenance of that river, do you think the whole catchment area should contribute more or less?—I do not say sixpence an acre, but that a small tax should be imposed on the different zones including the whole catchment area?—There appears to be some reason why it would be fair, but I think it would be extremely difficult to define the proportion that you would assess.

4444. They are all more or less interested in the great drain—namely, the river and its maintenance?—Yes.

4445. Mr. Barry.—That principle was, to some extent, adopted in the case of the Shannon Navigation improvements—the cost was spread over a very wide area?—I was not aware of that.

4446. We have it in evidence that even Galway was held under contribution for that improvement?—I thought the county contribution was for navigation.

4447. We have had another example in the case of the navigation of the Bann where the counties find almost the whole expense of the maintenance?—I believe in the case of the Bann that is the fact, and now that I recollect, the farmers did complain there that the water came down so rapidly that in fact they were nearly as badly off as before. Here also I think the assessment was for navigation.

4448. In the case of the Bann the navigation and drainage are so intermingled that you can scarcely say that the rate which is spread all over the counties is paid exclusively for navigation?—Perhaps not exclusively.

4449. Mr. Abernethy.—Did the farmers of the middle lands or low lands in the Bann complain of the water that came down?—In the case of the Bann they did complain after the drainage was effected that the water came down more rapidly.

4450. Mr. Barry.—I think you have alluded to a tax per acre, but the evidence that has been given to us points rather to a tax on the valuation?—The tax on the valuation, I presume, would be after the improvements are completed.

4451. I am talking of the whole area?—There is no provision in the Valuation Act for doing so.

4452. I was rather pointing to this, that if you have very poor bog land or mountain land, the charge should be very small—it would be very large per acre but small on the valuation?—If we assume that a 3d. rate is supposed to be struck, and the valuation of the bog

land is not more than 3d. an acre, it would take a large number of acres to make up the amount.

4443. The *Chéireann*.—What does that 3d. rate mean, is it on the assessment?—On the assessment. I suppose the present value of one-fourth of this area is not more than 5d. per acre. 35,000 acres of bog is certainly not valued at more than 3d. per acre.

4444. That is in the Barrow district?—Yes.

4445. Mr. Barry.—Could you give us the valuation of the whole drainage area above Athy and below Athy?—The valuation of the entire watershed above Athy may be taken at £216,000; of which £50,000 represents the flooded area and towns.

4446. Can you give it below Athy?—Yes.

4447. The *Chéireann*.—I enclose in a paper of your's you say, after alluding to the improvement that will arise?—At the same time, when large areas of land are rendered more productive by arterial drainage, the towns and villages in or near the improved area would become more prosperous, where there would be better markets, better trade, and higher rents. In addition to this, to relieve such low-lying districts from the injurious influence of miasma and surface water, must have a very beneficial influence on the climate and the sanitary conditions of such places, rendering them more healthy as well as more prosperous. I suppose by the miasma lands you mean the turf lands and bog lands?—Low-lying bog lands and marsh.

4448. If that is the fact that it renders the whole district more prosperous and more valuable, does it not rather favour the idea of taxing the entire catchment basin?—Well, if it does make the whole district more prosperous there would be some reason for taxing it, but there is a great deal of this Barrow district that I do not think by any possibility can be very much improved or only very slightly benefited.

4449. Even by arterial drainage?—Even by arterial drainage.

4450. Could you say what quality that is?—Under 500 or 600 feet above sea level the land is fairly good, above that height it becomes inferior, and at the highest points it is mountain.

4451. Mr. Pies.—When you say that there is a good deal that cannot be much improved by the drainage, do you mean lands that are now liable to flooding or lands in the neighbourhood of the flooding?—Lands in the neighbourhood of a flooded land.

4452. Mr. Barry.—Could you tell us what is the rule about rating lands after they have been free from floods?—Unfortunately there seems to be a great omission in the Valuation Act in respect of that. I have brought the Act here and I have written out a memorandum on the subject, as I thought it was likely to be asked about, explaining the difficulty. This is just a short statement relating to the subject of the question just put to me, and it is this?—The Valuation Act provide that no hereditament or tenement shall be liable to be rated in respect of any increase in the value thereof, arising from any drainage, reclamation, or embankment from the sea, or any lake or river, &c., made or executed thereon, within seven years next before the making of such valuation and revision. That was evidently to exclude those improved lands for seven years.

4453. The *Chéireann*.—Till they come into partial cultivation, and so on?—Yes; we have a great difficulty in carrying that out. "It was therefore intended that all such reclamation or improvements should not be liable for local assessments for seven years after their execution; and it seems also to have been intended that after the expiration of the seven years these reclamation should be valued for rateable purposes. The portions of the several statutes referring to the annual revision of the valuation of rateable property are silent with reference to the revaluation of the reclamations referred to, and as there is no mandatory instruction on the subject I have been advised that

there is no power under the Valuation Acts to increase or alter the valuation in those cases from the amounts at which they were originally settled and such valuations have not been altered in consequence. This anomaly in the Valuation Acts has always been apparent to me, and several attempts have been made to obtain amended legislation with reference to it and other questions, but I regret to say that the authority sought has not been obtained. I may add that according to the Valuation Acts, as they now stand, there is no power to make a revaluation of the lands in Ireland." Therefore with regard to all reclamations of that class that have taken place since Griffith's valuation which was made now about 38 years ago the increased value is not rated.

4454. And there has been no amendment of that Act?—No; there have been two or three attempts made, but on opposition in the House they were withdrawn.

4455. After the improvement and after drainage do you mean that you cannot assess the improved lands higher than they now stand?—Not for local assessment.

4456. How is the money to be repaid supposing the Government advance it?—By assessing the improved lands to the amount of their increased value.

4457. Mr. Barry.—Do you look upon that as a defect in legislation?—Yes; a very serious defect, and I have been trying to remedy it. It may be possible to do something in that way this session.

4458. Have you any views as to the question whether seven years is the proper time, or whether it should be a longer or a shorter period?—I think seven years is about the proper time. That was well thought of at the time, and we acted upon that at the time we made the valuation, and inquired into the period. With regard to those reclamations which took place prior to the valuation, and had been four years made, when we made the valuation we exempted them.

4459. Mr. Abernethy.—Arable land does not require such a length of time?—No.

4460. Mr. Barry.—If there is an increase of valuable value on the land which is improved, is not that pre-empto a relief to the taxation of the whole district?—No doubt it would be. With the increased value a lower percentage rate would produce the same amount.

4461. On that score, at any rate, the whole of the district would get some advantage from a drainage improvement?—I do not know that it would make any difference except this, that there must be a certain amount of money laid for the purpose of carrying out those works. If you wanted £10,000, even on the present valuation, it would be probably 1s. or 1s. 6d. in the pound. You must get the same amount whether the valuation is high or low; and if the valuation is high it may reduce it one-third, and yet you would have only a 6d. percentage rate instead of a 6d. rate.

4462. To that extent the whole district would benefit from the drainage improvement, would it not? assuming that it is re-valued?—Yes; certainly.

4463. Mr. Abernethy.—With regard to towns or the lowlands adjoining rivers subject to inundation, do you not think those towns ought to contribute something?—I do, unquestionably. The towns, I think, will get a considerable benefit by it. In fact with regard to those towns along the Barrow which I suppose you have seen, the inundation there, and the military state of those towns is very satisfactory in many cases.

4464. The Chairman.—I observe in this paper of yours you propose to assess towns which would yield a sum of £1,350 a year?—Yes.

4465. And your calculation is, I observe, that if the total expenditure of £350,000 was incurred it

leaves for public grant, without repayment, £268,750?—Just so.

4466. That is for forty-nine years, at the rate of 4 per cent.—I have assumed Mr. Howard's and Mr. Kinsaid's figures to be correct.

4467. I see from this paper that that is so?—They bring out a deficit of £250,000, leaving a subsidy of £248,000.

4468. I see you make a deficit of £268,000?—Yes.

4469. Mr. Barry.—Would you look upon that improvement of the Barrow as so important an improvement that it should be considered at all from a national point of view?—I certainly do. I think it is one of the drainage areas in Ireland that ought to be effected. I think it is a most melancholy state of things to see the good lands that are flooded near Monasteravena, and down to Athy. I think it is a most deplorable state of things if you happen to be there at the time when those floods are out.

4470. The Chairman.—Then you think it would be quite right from a national point of view that the Government should make a free grant of £268,000?—Yes; if the works are to cost what they are estimated by those engineers, I certainly think that the Government ought to contribute probably half. I do not believe it could be done by taxing the district to the full amount.

4471. That would be pretty nearly your figure. One half would be £268,000 instead of £248,000?—Yes, something like that.

4472. Mr. Barry.—Your idea, therefore, would be that you would first of all rate the land for the full benefit of the value received; secondly, rate the towns to the extent you have indicated, and then, that the Imperial taxation should provide the balance?—Yes.

4473. You do not, I suppose, give any opinion as to whether the balance is £268,000 or not?—No.

4474. It might be more or it might be less?—Yes; I have assumed that those figures that are in this paper were correct. I am not able to enter into that question at all as to the actual cost of the works. I should perhaps mention that although I am not in favour of taxing the whole 407,000 acres, yet I think the maintenance of the works, after the works are once carried out, ought to be spread over the whole district.

4475. The Chairman.—You have nothing further to say about the Barrow district?—No.

4476. Have you any remarks to make on any other district?—No; I am not perhaps so well acquainted with this subject as are the gentlemen connected with the Board of Works. It has not been exactly my business to investigate this matter.

4477. Perhaps you will divide the whole area into three zones?—The area of the watershed between Athy and St. Mullins is about 280,000 statute acres. This includes six towns along the river, viz., Carlow, Leighlinbridge, Bagninestown, Carnewbridge, and Gougansmanagh. The valuation of those towns is £240,000; that of the rest of the area, £185,000; total valuation, £425,000.

4480. We have had a suggestion—and perhaps while you are thinking the matter over you will bear it in mind—that if the whole district were divided into three zones, and the total expenditure was taken at the figure 20, the first zone might bear  $\frac{1}{3}$ , the second zone  $\frac{1}{3}$ , and the third zone  $\frac{1}{3}$ .—Of course  $\frac{1}{3}$  for the second zone, and  $\frac{1}{3}$  for the third zone, would reduce the thing to a very small amount. It would be something, but I think that that proportion would appear to be reasonable if the whole area is to be assessed. I can divide it, and we can see what that would be.

4481. The only difference was that the gentleman who gave the evidence took the second zone as benefited by a contour line of 100 feet above the drains

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 Grease

land, whereas you have suggested 20 feet!—No doubt the land would be benefited to a certain height.

4484. The Chairman.—I suppose you might consider the middle zone up to 100 feet as affected by fogs, and certainly benefited in the way that the previous witness has described!—There is no doubt that the drainage over this district would have a very beneficial effect on the temperature up to a certain height.

4485. Have you any decided opinion, supposing that all these drainage works were carried out in Ireland, and the bogs drained, as to whether it would make a perceptible difference in the temperature?—Some time ago I and some others were considering that question, and we estimated that an average annual increase of 1° of temperature would represent 4° or 5° in summer, the time for the maturing and ripening of crops.

4486. Of course that increased temperature would vary from zero—that is to say, the drained land—up to the highest point in the catchment area!—I would not go beyond a certain amount. I would not go beyond what the gentleman you have referred to has said—namely, 100 feet.

4487. Mr. Abernethy.—But that improvement of 1° to 2° would be a great advantage as far as crops are concerned, and to the arable land!—Yes.

Mr. James Price called in and further examined.

4491. The Chairman.—I believe you are requested to lay before the Commission the cases of the residents adjoining the Lower Barrow!—Yes.

4492. Do you appear to-day in any other capacity?—There is a commission in Carlisle, who took up the question of all the information on the Lower Barrow, and they put their case into my hands before; but since I was here they have written to me to ask me to go more particularly into the case of the Lower Barrow.

4493. Then you represent the residents!—The mill-owners, the store-owners, landowners, and the navigation. The navigation I think joined with the committee in wishing me to undertake this case, which I did.

4494. Perhaps you will proceed to make your statement, and then you will be able to answer any question which might arise upon that statement!—The river Barrow is about 80 miles in length, taking it not according to its windings, but in straight lines from its junction with the river Suir up to the very top. That would be the length of the drainage area. Above St. Mullin's where it joins the tidal water, it is 60 miles in length. The drainage area above Athy—that is the topmost drainage area—is 497,500 acres. From Athy to Bagnalstown the drainage area is 196,490 acres. From Bagnalstown to St. Mullin's it is 85,960 acres, and below St. Mullin's it is 64,440 acres. The total area is 757,790 statute acres. The principal tributaries below Athy which I am dealing with now, are the river Grease, the river Douglas, the river Lera, and the river Barren, and some minor tributaries, at present nearly throughout the whole length of this river, for certainly more than two-thirds of it, the channel is of insufficient capacity to discharge the maximum floods. I have marked on the Ordnance maps generally the land that is flooded, and I have coloured it blue. This land is not very wide in its extent, but it is on the whole considerably more valuable land per acre, probably double or triple the value per acre of the land proposed to be improved in the upper drainage district. It lies along the river and it is generally alluvial land, and good meadow land.

4495. That is on the Lower Barrow!—Yes, I am confining myself now entirely to the Lower Barrow.

4496. Will you show us the Ordnance map, embracing the Lower Barrow!—This is the Ordnance map,

4488. That being so, would that be any reason for taxing that land!—Certainly, it would be one reason.

4489. Mr. Barry.—There is a memorandum by you which has been handed in to the Commission. I do not know whether, after the evidence which you have given about the question of the acres, you would desire to alter in any way the figures of that memorandum, or whether we should take your evidence as it is, and not put the memorandum on the notes!—If you would allow me to look into this question again, then I should be a better judge whether I should modify it or not.

4490. Mr. Price.—Have you any knowledge of the present poundage rate of the poor-rate in these four towns in the Barrow district. Does that come under your notes!—I have not.

4491. Mountmellick, Portlinton, Monasterenry, and Athy!—No.

4492. We have some figures given here by a gentleman who does not come from that neighbourhood, but his view was that the poor-rates were higher generally in the district of the Barrow than in the other parts of Ireland!—I should be afraid to go into that question, because I am not sufficiently acquainted with it.

The witness withdrew.

scale 6 inches to a mile (producing the Ordnance sheets). It was worked downwards from Athy to Carlow. Beginning with the first sheet you first come to Ardara weir.

4497. Mr. Barry.—What happens there!—That land is all flooded in ordinary floods.

4498. What is the area!—I have not got the area of each of them. They only sent me back the plans yesterday.

4499. Can you tell me the height of the land above Ordnance datum!—The water there is about 180 feet above Ordnance datum.

4500. Mr. Abernethy.—That is the depth of water that is flooded on the surface!—I should think it is flooded to about a foot of water. I do not think I could tell you exactly the height to which they are flooded. I have only marked the lands that are flooded, because I have only had a few days to make the observations in, and I could not mark the levels. I merely had time to mark the lands that were flooded.

4501. The Chairman.—There is one place above the river marked 183 feet, but that is not coloured!—No.

4502. Mr. Barry.—You think it is flooded about one foot!—Yes.

4503. That is in times of extreme floods!—In times of flood.

4504. Mr. Abernethy.—It is flat meadow land I suppose!—Yes. Then there is another small piece below Ardara. These are my soundings taken in the summer in different parts of the river, principally with reference to navigation. Two and a half miles below Athy to Lovinstown there is a canal. The river is not used for navigation.

4505. The Chairman.—A distance of two miles!—Yes.

4506. Mr. Abernethy.—That also is flat meadow land!—Yes.

4507. Mr. Barry.—There is very little flooded there!—No.

4508. Mr. Abernethy.—These are all portions of flat meadow land!—Yes.

4509. Mr. Barry.—Are there any particular cases arising upon either of these two Ordnance sheets that we have examined!—Yes—mill cases. There is first of all the Ardara mill. In fact the Ardara mill will have to be done away with altogether. This part of the river below the Ardara mill has not a sufficient

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channel to carry away the flood water as it is. Of course I will come to the question of whether the flood water will be increased, but at present they are in very great difficulties. In fact the mill itself, and up to the very floor of the mill, is flooded, and is stopped by lockwater; and in future if that is increased to any degree, my own impression is that it would be more convenient to buy that mill altogether, and buy the water power, and do away with it.

4510. The Chairman.—That is the only mill down to that point?—That is the only mill down to that point.

4511. Mr. Abernethy.—That is a flour mill I suppose?—Yes, it is a flour mill.

4512. The Chairman.—Is there any mill shown on the second sheet?—Yes, at Levittown there is a flour mill. I do not think that would have to be done away with, because I think, in any case, very considerable works would have to be done below the mill in the river, where there is no canal, and this has to carry the navigation—that is, below Levittown.

4513. Are there any sluices in the river, either at Andree or Levittown?—No, no sluices at all.

4514. Mr. Abernethy.—There are no sluices in the weir at Levittown?—No, I did not notice any sluices the whole way down—that is anything worth talking of, or of any effect on floods. There are none for letting down floods in any way. The floods must fall over the weirs.

4515. The Chairman.—Is there anything further you wish to call attention to on this second sheet?—No, except that this is a particularly bad part of the river, between Andree and Levittown.

4516. Who is responsible for keeping this river in a proper state as to flood water?—I do not think there is anyone at all.

4517. Not the Canal Company?—No; I think the Canal Company are responsible for keeping it fit for the traffic of the canal and no more.

4518. Do you make that statement from personal knowledge of their Charter or Act of Parliament. By what authority was this navigation made?—By a Charter. I heard the whole matter discussed, and there was not one word in anything I heard, either read or discussed, about it. They never stated that they were even responsible for keeping the river in a state for flood drainage, or drainage at all; but I think they are bound to keep it in a navigable state.

4519. I wanted your opinion about that. As you are here representing certain interests, I presume you have made yourself acquainted, not only with the history of the navigation, but the obligations that attach?—I have as far as I could.

4520. Then nobody is responsible for keeping the river between Andree and Levittown in a proper condition for carrying off flood water?—No; I think it is in its natural condition.

4521. Is it in a good or a bad condition?—In a bad condition. The whole river is shallow. I do not say it is filled up with silt, or anything of that kind; but it is the hard bottom of the river, according to these soundings, and in hardly any case did I find an accumulation of silt, except it may be just next to Andree weir.

4522. What is the bottom of this river?—It is hard ground, and in some cases rock.

4523. What rock?—It is limestone rock.

4524. Mr. Abernethy.—Is the wheel of the mill drowned during floods?—Yes, all these wheels are. I do not know whether in this mill they have means of raising it, but in some cases they have.

4525. The Chairman.—Where is the rock in this part?—I do not think there is any rock in that particular part. It is a hard bottom.

4526. My question was confined to the distance between Andree and Levittown. You say it is a hard gravelly bottom?—I did not find any rock there at all.

4527. Mr. Barry.—Do you know what the fall is at Levittown lock? I have it here at seven feet three

inches?—I went according to the falls, I think, on that old map. I have made a section showing all the different falls at the different locks. (Producing same.)

4528. Mr. Abernethy.—Were those mills and weirs in existence before the river was canalised?—I think the weirs were all constructed for the navigation.

4529. I am speaking about the mill weirs?—I cannot tell you about that. I do not know the history of the mill weirs. It is more likely, I think, that they existed before the navigation, and that there was mill-power there.

4530. The Chairman.—I thought the weir put for the canal answered for the mill also?—It does.

4531. Do you consider that taking so large a volume of water along the canal, because there is a constant stream, has tended to silt up the river between those two points, Andree and Levittown?—No; there is no silting up at that part whatever. I examined it particularly as to silting up. The only silted up parts are further down.

4532. Mr. Price.—Do the people whom you represent as Andree—the property owners and house owners—consider that they are more liable to floods of recent years than they used to be?—Yes; and there is a great deal of evidence on the subject which I will give you the particulars of. I may as well, while I am referring to it, refer you to this Levittown mill and to the evidence given by the owner of it. It is to be found in the blue book. Mr. Frederick Hargrave, of Levittown, has been there 38 years and knows the place. Generally the floods in the old times took three days to rise. During the last five years, which he attests to the Bathangan drainage, the Leer drainage, and a portion of the Giesse drainage, he says the floodwater in twelve hours instead of three days, and in one case he knew where it rose four feet in twelve hours. That is the effect of his evidence. Then Mr. James Byrne, of Newtownpinnock, the next lock below, says that the flood rose in a single night, which he expected to rise under ordinary circumstances in three days, and that he had not cut his meadows, except in the year 1854, for four or five years.

4533. Where was that evidence given?—It was given before Lord Chelmsford's Commission.

4534. Now, we will go on to the next sheet?—That is Magray; but before I leave that part of the river I may as well give you some particulars about it. The Levittown weir is occasionally drowned. In the channel below Levittown, coming down from Levittown to Magray, there is hardly any fall in the river at all, and there is no canal. The channel is about 150 feet by 4 feet in summer, and by about 7 feet in winter. Part of that channel is only 110 feet wide, and from 3 feet 2 inches to 1 foot 6 inches deep.

4535. Mr. Abernethy.—Is that rock?—No; I cannot be very clear about the rock, because it was only where it was very unmistakable that I thought there was rock, but it is hard ground.

4536. Did you sound along that reach of the river?—Yes, I did, along the whole of it.

4537. Did you find a hard bottom throughout?—I did.

4538. Mr. Barry.—What do you consider a navigable depth in summer?—I do not think any boat more than three feet could go in that canal.

4539. What do you consider the proper statutable navigable depth?—I do not think there is anything laid down as a proper statutable navigable depth; but in summer three feet is the maximum depth a boat would draw. In a wet summer I should say four feet.

4540. The Chairman.—Does that level part extend below Levittown to Magray bridge?—Yes.

4541. This shows a considerable amount of flooded land?—Yes, there is a considerable amount of flooded land.

4542. Down to Leer bridge?—Yes.

4543. Mr. Abernethy.—Is that low flat meadow land?—Yes.

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4544. To what depth is it flooded?—I cannot answer exactly about that.

4545. The Chairman.—This extends from Mageny about six and a half miles down to Leer Bridge, which is nearly nine miles down?—Yes; eight and three-quarter miles.

4546. Mr. Barry.—For what length is there a deficiency of the navigable depth in that portion of the river?—Not in that portion of the river—that is not the worst portion of the river.

4547. I thought you said just now, instead of having only three feet you had only one foot six?—I meant taken crossways in the section. You will get a part where you get over three feet. A boat drawing three feet could have got over any part of the navigation at the time I was on it, but it would have had to twist about. It would not get it everywhere.

4548. The Chairman.—Have you got the quantity of land flooded?—It is about 519 statute acres. The quantity is small, but is divided into a great many parts.

4549. Mr. Barry.—Could you give the depth to which they are flooded?—I do not think I could do that. This was the most I could do to get it in in time. I could not give the depth. It would require a lot of inspection to take the depth, and you would have to get a great deal of accurate information from the people of the country.

4550. The Chairman.—Then from Leer bridge about 8½ miles down the river to 11 miles?—There is about half that distance flooded.

4551. There are no mills all the way down there?—No.

4552. Mr. Abernethy.—And that is flat meadow land?—Yes, it is all flat alluvial land.

4553. Meadow land?—Yes.

4554. You do not know anything about the depth of the flooding?—I do not; I cannot tell that. As I have said, it would require very accurate information from the people of the country to know exactly the depth to which it was flooded.

4555. The Chairman.—That brings you down to Carlow. That is 12 miles exactly?—Yes.

4556. There does not appear to be any land flooded there?—No; that is principally with reference to the town of Carlow itself. This is what they call the Connell quay, and there are some important stores a little bit back from this, and these are all flooded.

4557. This is the great basin which we saw?—Yes; it goes over the whole of that, and floods the whole of this Graigue District. That is very much flooded, and it is inhabited by poor people. Carlow is there itself flooded, and I can give you the evidence which was given on that subject.

4558. The Chairman.—What river is that that comes in there?—That is the Barren river, which comes in just below Carlow. That has been drained.

4559. What is the fall at the weir that keeps up the water?—It is of course varies, according to the state of the river. In a great flood there is only 18 inches of a fall.

4560. Is that weir over drowned?—Yes, it is drowned, because it is within 18 inches.

4561. Mr. Abernethy.—That is not drowned?—No, it is not over it altogether, but it is drowned partly as a weir. There is 4 feet 9 inches difference of level in the lock.

4562. Mr. Pin.—Have these parts of Carlow always been liable to be flooded?—Yes.

4563. Since the navigation works were completed?—From time immemorial; at least so the people at present resident say.

4564. Are they in recent years more liable to be flooded than they have been in former years; does the evidence relate to Carlow?—It does. Mr. Bolger, who manages Messrs. Watson's malt stores in Carlow, said the flood used, sixteen years ago, to take two or three days to rise. In 1879 the flood came down in twelve hours after the rain ceased.

4565. Mr. Abernethy.—In the upper district?—Yes; on that occasion the water came over Connell quay 16 or 18 inches, and they were obliged to make dams and sops when they saw the water beginning to rise, to save their materials in their malt stores.

4566. Mr. Barry.—Is the flooding at Carlow more particularly above the weir?—Yes, above the weir.

4567. There is very little flooding below the weir?—Hardly any below the weir.

4568. Do you think there is always a fall over the weir in time of extreme flooding?—Yes; in order to retain that mill and to let off the floods, there should be very large sluices. In fact, the whole of Carlow weir should be constructed in sluices.

4569. Mr. Abernethy.—There are no sluices there now?—No.

4570. Mr. Barry.—About what size sluices do you think would be necessary?—I should think they would require at least 99 feet sluices, say four of them.

4571. That is, 99 feet of sluices altogether?—Yes.

4572. Mr. Pin.—What is the length of the weir there?—I cannot give it you exactly. There is one more matter I would refer you to in Carlow. Mr. John Kelly gave this evidence with regard to the flooding of the town that, in 1865, 100 people died of cholera in Graigue, and that in 1870 there was fever immediately after this flood, and that the rates went up from 1s. 6d. to 2s. 10d. in the pound.

4573. Mr. Barry.—Does he mean to say the floods gave the people cholera?—There was fever; the cholera was from the bad sanitary condition, and from the water too. But it was in 1870 he said there was very bad fever there immediately after this flood.

4574. Mr. Abernethy.—It only rose 18 inches over the quay, I think you said?—Yes.

4575. And according to your evidence even a bank of sods prevented the flood from getting into the stores?—I do not know exactly where they put the sods, whether it was in front of the stores or on the quay.

4576. Have these been any steps taken to raise the quay at all to the extent of two feet?—No.

4577. The Chairman.—How many mills are there at Carlow?—I think there is only one.

4578. Then there is nothing to comment upon between Carlow and the bottom of this sheet, which takes us down to 15½ miles?—There is very little flooding there; but there is a very bad piece of river at the fourteenth mile. It divides into three channels there, and the westerly one is the one used for navigation.

4579. The widest is the most easterly one?—Yes, the soundings are very bad there, and the power of discharging in that portion is very bad.

4580. Mr. Abernethy.—Is there much flooding on the bank adjoining?—No; but it throws back-water up upon Carlow. On that sheet there is flooding just after the fourteenth mile for about a mile. Then this is Milltown, and there are important mills there.

4581. The Chairman.—That is about sixteen and a half miles down the river?—Yes.

4582. Mr. Barry.—There is a very heavy fall there, is not there?—The County Surveyor is of opinion that at Milltown the bridge is at present changed to its utmost in conveying the water, and that it would have to be rebuilt if the floods were increased.

4583. Is that Millford lock?—Yes.

4584. Mr. Abernethy.—There is a fall of 9 feet there?—Yes.

4585. The Chairman.—There is some flooded land there at about eighteen miles down?—Yes.

4586. There are no mills between here and Leighlinbridge at twenty miles?—No.

4587. Mr. Abernethy.—That is flat meadow land again?—Yes. At Leighlinbridge the question is principally with reference to the stores that are there.

4588. The Chairman.—Have you a mill there?—No; it is malt stores.

4589. Mr. Abernethy.—Were those originally mills

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and afterwards converted into stores?—No; I think those are rather new.

4591. You referred to certain mills at Milford; are they old mills?—I think they are old mills. As to the mill stores at Leighlinbridge, Mr. John Nolan said he built a store at Leighlinbridge lately, and he would not have done so if there had been any chance of increased flood.

4592. Mr. Pitts.—What do you say about the mills at Milford. Are they mills now or mill stores?—They are mills. As well as I can now recollect they do not use the whole water power there at all, but only a portion of it, and there is a large store in connection with it. They do use some of it. There is an important matter at Leighlinbridge. Mr. James Butler is a partner of the Messrs. Watson at Leighlinbridge who have barley stores there, and he says the moors are only six inches above the highest flood level now. The evidence given by Mr. Butler was that if the flood had risen six inches higher, in five minutes there would have been £1,000 worth of barley damaged.

4593. Mr. Barry.—He is a very independent man to build his floors at such a little height above the floods?—But it is so; and he does not want the floods to be greater.

4594. The Chairman.—I see the canal is diverted from the river for about a mile and a half—from what place to what place?—Twenty and a half miles down nearly to twenty-two miles.

4595. Twenty-one and three-quarter miles exactly it seems to be. What state is the river in where the canal has been diverted from it?—The river is not good at all there.

4596. Have you examined that part of it?—Yes; the soundings are all marked on it.

4597. Is it silted at all?—Not at all. There is some silt above Leighlinbridge—and islands have collected there. There is silt with reeds and different things growing on it, and in the same way above Coler.

4598. Is not that silted?—Yes; that is in the dead part of the river.

4599. Do you know what the history of the river is in this diversion?—I should mention that at Leighlinbridge the ledge is absolutely unfit to vent any increased flood. It is barely able to vent the floods now, and it would have to be entirely rebuilt. The lock above it is occasionally drowned.

4600. Mr. Barry.—Is not that an affair for the country?—I think so.

4601. The Chairman.—Then there are no mills or mill weirs down to Bagnalstown?—No; there there is one of the most important mills on the whole river, and that is Messrs. Brown and Crosthwaite's mill at Bagnalstown.

4602. Mr. Barry.—There is very little flooding there?—There is a very bad river at Bagnalstown for discharging floods. I took soundings there and it was only two feet deep, and it rises six feet four inches, covering all these meadows.

4603. Mr. Pitts.—Above the weir?—No; this is not above the weir, this is below the weir.

4604. Mr. Barry.—Covering what meadows?—There is only at the outside half a mile in length shown on the map as flooded?—Yes.

4605. The Chairman.—I see the canal is diverted here?—There is a short piece of river, and then the canal ends, and then a short piece of river, and then a piece of canal.

4606. There is diversion again down to twenty-three miles?—Yes.

4607. Mr. Barry.—Then there is a lock at Bagnalstown?—Yes.

4608. And the flooded land is above the lock?—It is above the lock, but it is on the main river.

4609. Mr. Pitts.—It is between the weir and the lock?—It is between the weir and the lock; but this lock does not throw any water on this land; it is the natural river there.

4610. What are the red lines?—Those are the quarter mile marks.

4611. Mr. Barry.—The next piece of flooded land is at twenty-five miles?—Yes.

4612. Just after passing through the railway?—Yes.

4613. The Chairman.—There is a very considerable portion of flooded land on both sides of the river?—Yes, for about three-quarters of a mile.

4614. There are no mills between Bagnalstown and this place down to twenty-five miles?—No.

4615. Mr. Abernethy.—Those are flat meadow lands again?—Yes; they are nearly all flat meadow lands—narrow pieces between the high land and the river.

4616. Mr. Barry.—There is some more land at twenty-six and a half miles, and more at twenty-eight miles?—Yes.

4617. The Chairman.—Here again is a diversion?—Yes; that is a dammed mill.

4618. There is a lock?—Yes.

4619. Mr. Barry.—Then there is a small piece at twenty-nine miles?—Yes; this is what they call Gores bridge; at twenty-nine miles there is a considerable piece flooded there.

4620. Has that bridge anything to do with it?—That is not one of the bridges I noted as being insufficient.

4621. I see the note in this, "Island, great obstruction below the bridge"?—Yes.

4622. Mr. Pitts.—Was that island there originally, or is it the result of silt?—That was there originally; I find some islands are not marked on the Ordnance map, but this one is.

4623. Mr. Barry.—Then there seems to be no flooding on the next sheet?—No, no flooding; there is a very rapid river down to thirty-six miles; St. Mullins is at forty-one miles.

4624. These you get to the tide?—Yes.

4625. Mr. Pitts.—You say you found islands not shown on the Ordnance map—these Ordnance sheets are dated 1874?—They were not revised.

4626. So that if they had come before 1874 they would be shown on the Ordnance map, I presume?—Yes.

4627. Mr. Barry.—Can you tell us what weirs are drowned in times of high flood and which run free?—Looking over my notes I think I could.

4628. Mr. Abernethy.—With regard to all these flat meadow lands, would not an embankment of very moderate height joined to the high land prevent them being injured?—Yes; I think most of them might be embanked, and of course the river itself should be improved, otherwise the navigation would be destroyed altogether.

4629. That is for the navigation people to do?—Yes.

4630. Mr. Barry.—Why would the navigation be destroyed?—That is a different question, and that is more with reference to the lowering of the water in the summer; I do not consider that the land is at all the principal interest on the way down, I look upon the mills and the navigation as the principal interests.

4631. Mr. Abernethy.—During summer the navigation channel would be much so fringed, because there is but a little accumulation in any part?—There is but little affecting the navigation.

4632. The Chairman.—Have you had the figures put before you of the net receipts of the navigation per annum?—I do not recollect them, but I know I did hear them.

4633. Are you aware that the last year the return was made the net receipts were about £900 for the year?—I was not aware of that; of course there are other considerations beside the net receipts, because a great deal of this river runs where there is no railway near, and the mills and stores being on the course of the river it is of very great benefit to the mills and stores, and generally to the traffic of the country. For instance, Messrs. Brown & Crosthwaite pay £3,000 a

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year to the navigation for tolls; I suppose it is for tolls and boating besides.

4634. *Mr. Barry.*—Where are their mills?—At Baginbown.

4635. One question before we leave the question of the land. You have made an estimate of what works were necessary in your opinion, below Athy, to accommodate floods supposing that 100,000 cubic feet more water were brought down 1—80,000 to 100,000 more cubic feet.

4636. Do you recollect what that estimate was?—My estimate was not a close estimate, because I had not time to make it, but it was from £100,000 to £120,000; the embankments would have to be very long; there is very little land; the land is narrow and any embankment that had to be made would have to be long.

4637. Could you tell us how much of that estimate would have to be charged against embankments for the purpose of defending land?—I do not think I could.

4638. *The Chairman.*—Did that estimate include deepening this bad bed of the river?—Deepening part of it.

4639. *Mr. Barry.*—You cannot tell us how much would go to provide for embankments?—No, I could not.

4640. Could you tell us how many miles of embankment there would be?—I could not.

4641. You could tell that in?—I could make it closer.

4642. *Mr. Abernethy.*—It does not appear there is any very great length of embankment required of great height?—No. I may tell you generally, assuming there is more flood coming down, all the mills would require to have their backwaters locked to and the river below, which forms the tailrace, very considerably deepened at the upper end. It is exactly similar to the point I had to deal with in the case of the Lerr drainage. There was a miller there who has also given evidence—a Mr. Hansen—with reference to the Lerr drainage, which falls into this river. He said that immediately after the drainage the floods were brought down to such a degree that his wheel was drowned. The matter was put into my hands, and it became a matter of arbitration, and the arbitrator decided in favour of my view that a very considerable deepening for nearly a mile, or over a mile certainly, would have to be made. That was carried out, and that mill alone cost for that deepening £1,500.

4643. *Mr. Barry.*—To go back to the land. In no case this flooded land you have shown as would be flooded if the proprietor or occupier takes the trouble to make any banks at all?—Yes, in some cases there are banks.

4644. Are the lands flooded there?—Yes, they are; the banks are not sufficient. There are banks in some places formed by the towing path. The towing path forms banks in some cases.

4645. The landowners have not taken the trouble to make any banks to keep the flood out on the land you have coloured blue?—I do not think they have.

4646. They do not consider it worth their while?—No. It is not in every case where you could drain the land and put embankments too. There would not be fall enough.

4647. There are a great many miles, as we saw on our inspection, of land which could very easily be protected by embankment?—Yes.

4648. Then why should somebody else be asked to put these embankments if the owners will not take the trouble?—If it is settled that no more water is coming down, then I do not think anybody should spend a farthing on the river.

4649. That makes the position this—that supposing a small quantity, or any quantity, more water is sent down, you would lay upon the people sending down

that water the burden of fully protecting the land, which the owners have not taken the trouble in time past to protect in any way?—No, I do not think so.

4650. Does that sound just?—No, certainly not; but the effect would be this. I merely tell you what I know, that every man on these forty miles of river would make a claim before the Government Arbitrator, and would require to have his claim regularly sifted and evidence given on it to see whether he would be likely to be damaged before the works were made at all. If he is not satisfied with what the Government Arbitrator says he goes to the jury, and the jury give him, I need not tell you, a very liberal sum. That is what I should apprehend if I was engineer of the upper drainage, and I should not contemplate sending down anything at all in the way of sums of water. I think it would ruin the whole project. I do not talk about the justice of the case. There might be cases in which injustice might be done, and where people would pay more than the amount of damage that would arise; but that they would have to pay is quite plain. If it is the opinion of eminent engineers that more water would go down, unquestionably every man all the way down who has an acre of land flooded would put in a claim.

4651. Although it is flooded now, and he does not take the trouble to prevent it?—Yes, if it is flooded a foot or six inches more than before; and no engineer has any power. The jury award what they like, and I have known cases of great injustice in consequence of it.

4652. On that matter about the jury you have had a great deal of experience?—A great deal.

4653. Is it your opinion that an appeal from a skilled arbitrator to a jury is a mode of assessing damages which is to be recommended?—No, I do not. I think it is a most unjust way of doing it, because the sympathies of the jury are entirely with the claimant.

4654. *Mr. Abernethy.*—It renders nugatory the employment of skilled valuers?—Entirely. I should be delighted if there were no jury.

4655. *Mr. Barry.*—You have had a great share of experience, and you can speak feelingly on the subject?—I can. I know all about railway and drainage land. Everyone dreads a jury in almost everything, but still in this particular case I have mentioned on the Lerr drainage there was no jury at all. It was a skilled arbitrator and an engineer who decided that this had to be done in order to protect the mill. I have other matters to bring before you beside this, but as far as the navigation goes I have nothing else to say.

4656. All the evidence you have given is on the assumption that there will be more water?—On the assumption that there is going to be more frequent floods in winter and less water in summer time, and affecting navigation. The only way in which the excess water affects the navigation is that the floods will be more frequent, during which they will be unable to navigate.

4657. As far as effects go your evidence is concluded with that last remark of yours?—On the navigation.

4658. And on the land?—Yes.

4659. And on the mills?—Yes, on the mills. If there is to be no more excess water than at present I do not think any one of them can make any claim.

4660. *Mr. Fox.*—Are you of opinion that there will be more frequent floods and that the floods will be higher when they do come?—I am. I should like to give an explanation of an answer that I gave on a previous occasion. There was a letter that I wrote giving the section of the river at certain places, and it would appear from the way I answered it, that for the whole distance between these places the section was so and so. I should like if I could to state the matter over again and give the exact length of each section.



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(Mr. Percy Lestock, Chairman of the Barrow Navigation Company, and Mr. Miskell, the Secretary, were here called in.)

The Chairman.—Mr. Price has been giving some evidence as to the effect of flood on the Lower Barrow and he is now going to state his reasons why he thinks, if the drainage works are carried out, there will be more flood water. The Commission thought it was desirable that you should be present while he makes that statement.

4651. (To witness).—Will you proceed with your statement?—This Upper Barrow district now has an amount of 25,000 acres which is covered with flood from one foot to two feet deep, and this acts as a reservoir to mitigate the effect of sudden floods. This 25,000 acres is about one-eighth part of the whole drainage area of the upper part. Comparing it with other districts where there is also a reservoir for floods which mitigate their effect, Lough Neagh and the lakes are about one-twelfth or one-thirtieth of the whole drainage area; in the Corrib district the lakes are about one-tenth; in the Shannon about one-fifth or one-third second of the whole drainage area; and in the Erne one-twenty-second; so that Corrib is the best of for lakes for holding up floods. Next to that comes the Dams, and then, thirdly, comes the Barrow, so that the advantage to the river below of having these 25,000 acres to cover with water before it can pour down in its full force is very great. It puts us on a par with about the mean of the others. It is better than the Shannon and better than the Erne. To put it in a way that will be very easily remembered, assuming that the excess flood would be from 80,000 to 100,000 feet per minute, you will find that according to that, two acres will be covered one foot per minute. I put it in that way so that it can be easily recollect. Therefore, in order to cover the 25,000 acres you find that it will take eight days or from 80,000 to 100,000 feet per minute to spread over that ground one foot deep. I think it is sometimes more than a foot deep. I say that if the reservoir is taken away and you do not allow the floods to spread as they would not if this plan were carried out, that excess quantity of from 80,000 to 100,000 cubic feet per minute must necessarily be sent down rapidly to the Lower Barrow. The only case in which a flood in former times could equal a flood in the future, when these works are carried out, would be when that basin was completely full. It is a very rare thing that after eight days' flood, before that has time to run off, another big flood comes. It is possible it might come, and it does probably occasionally come, it may be once in twenty years; but it is not an ordinary condition of things. But it would be an ordinary condition of things that when there was a four days' flood and no way of spreading provided that that excess water, which at present spreads over this land, should be added to the normal floods of the Lower Barrow by doing away with that reservoir. For that purpose, I am of opinion there are two ways of making it either by improving the Lower Barrow or by making a great reservoir on some of the waste land. My own opinion is that it would be far cheaper and a far more thorough remedy to form a reservoir of about 2,000 acres to hold the water five feet deep. That would have the same effect as 10,000 acres a foot deep, but the advantage of having an artificial reservoir with sluices would be this, that it would be perfectly certain it could be emptied before another flood. Therefore I would not propose or think it necessary to have so large a reservoir for holding floods as there is at present. One reason for expecting a greater flooding is the tributaries. The important tributaries below Athy, the Ouse, the Lerr, the Douglas, and the Barrow, all at present discharge before the main flood can reach it. I think it is admitted in the evidence that the main flood does not reach the part of the Barrow below Athy for a week or a fortnight. Under different circumstances it would reach there sooner or later according to whether the basin was full or not;

but during the time the floods formed, the other tributaries would have time to run away. If these works were carried out the floods would undoubtedly come simultaneously and in that way add very much to the amount. With reference to the precedent for this kind of thing the Druma was referred to, and I would ask the Commissioners if they would look at the report of Mr. Mulwary, I have not myself seen it but it was before the drainage of the Druma was carried out, before 1851.

Mr. Lestock.—I have seen it and I quoted from it in the statement I sent to the Commissioners. It was a report furnished to the Board of Works.

4652. The Chairman.—What was the title of the Blue Book.

Mr. Lestock.—My reference is to the evidence of Mr. W. T. Mulwary before a Commission of the House of Lords as to the Druma river. It is in the report of the Commissioners of Public Works, but it is the only one of my quotations that I have not put a date to.

4653. Mr. Barry.—Is it necessary to refer to it?—Except that it gives the flood discharge of the river Druma as 135,000 cubic feet per minute, and Mr. Manning's evidence is that it now or since has yielded 357,000 cubic feet.

4654. Mr. Abernethy.—Since the drainage was carried out?—Yes, I asked Mr. Manning to refer to this report of Mr. Mulwary, as I supposed he could have access to it to see whether that statement of mine was correct. I do not like to give it further than that I believe what he stated before the drainage was done was that the discharge of the Druma was 135,000 feet, and that he had actually measured it.

4655. Mr. Barry.—That might be due to thorough drainage or due to arterial drainage. Unless we had the evidence before us we could not really say what it was due to?—Well, there was another case in which evidence was given with reference to the meeting of rivers and the effect of floods coming down at different times. That was on the Little Druma, and that evidence was given on the former occasion by Mr. Breton to Lord Castletown's Commission. There are two rivers which meet together forming the Little Druma. One is called the Castleknock branch, and the other is called the Rossera branch. One of these branches had been disused twenty years ago, and the effect was that the flood of one entirely ran off before the other. The things were altered afterwards and the other was disused, and Mr. Breton was entirely drowned out with five or six feet of water on his land. That shows the effect of altering the condition of the water by making the floods meet together and causing flood.

4656. Mr. Abernethy.—I think you stated that in the case of the river Barrow the floods from the tributaries would pass off before the main flood passed down the river?—At present.

4657. Supposing it continues raining over the whole district?—Yes; a good four days' rain is as much as you have in Ireland.

4658. The Chairman.—You are referring to the tributaries below Athy?—Yes; another way I have taken it is this. Besides the spreading over the ground, which diminishes it, I put it in this way, that these rivers which would give about 300,000 cubic feet per minute—the united rivers—I have taken it would have run down to 100,000 before the main flood came down. They have a rapid fall.

4659. Mr. Abernethy.—Could you indicate the site of these reservoirs you have suggested?—I could, and I have indicated it on the larger map. The principal one would be between Portadown and Monasteraven. There is flat land there, and there is the Slieve river coming in from Eglar here, which is very suitable. It is no matter which river you take, so long as you take 80,000 cubic feet per minute out of the flood discharge. This is Baylough, and a portion of the ground similar in that way would be even better on

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the Slane river. This is high ground on each side, and by putting a back trench all along here for draining this high ground, an embankment, ten or eleven feet high, could be made, and the whole of that area without flooding anything but what is marked there could be made a reservoir.

4670. The Chairman.—Have you estimated the cost of that?—I have estimated the cost of the whole. My statement is for the whole thing.

4671. Where would the other reservoir be?—By Raylough. It would flood this piece of ground, and by keeping the embankment back here, I could put the dam at Raylough bridge. There is that large piece of river there. There is nothing to do but put the embankment along outside the flooded land, and the bank there would be part of the reservoir. I should have to put a dam there too. [Further describing the position of the reservoir on the map attached to the report of Lord Castleown's Commission.] These might be more convenient places for this reservoir, but there could not be a more convenient place for the Slane river reservoir, and if you were to save that discharge from going into the river, you would prevent the floods.

4672. Mr. Barry.—There is a considerable fall in the river, and there are tributaries above that point?—Yes, and I was saying that the feeling of the people about Carlow—their natural common view—is that the formation of a reservoir is the most certain way of providing against the damage that will be done by the river. I think I have nothing further to say, except just with reference to the levelling of water in summer. The Canal Company apprehend there will be a deficiency of water in the summer, and the millers apprehend the same thing. This river comes from such very spongy districts where there is such a quantity of soaked lands—and there is as much soaked land as there is flooded land—that they apprehend if these drains are made so perfect—and, of course, it will lead to cross draining and sub-draining—the water will have dried out completely in summer, and that it will become very low, and much lower than at present. As a case in point, evidence was given with reference to the Barrow river at Carlow, which was drained, and this is the evidence of the man who worked the mill. James Brown who worked the Barrow mills formerly had two wheels with two pairs of stones to each. One wheel had worked constant and one worked short time. Now he has only one wheel, and in the summer time he can only work six hours out of the twenty-four. He has to collect the water for six hours. That is, of course, a case in point, because that is the case of a drainage carried out.

4673. The Chairman.—I presume you would suggest that this reservoir be kept full for summer use?—I would use this as a pond in summer, because, supposing the Lagan floods were coming on, for instance, information could be given by telegraph, and the river being in an empty state the water in the reservoir could be let off in a day or so in quite sufficient time to hold a flood in summer. I certainly would not waste that 2,000 acres. I think if it were all planted with oaks, it would be very valuable.

4674. Mr. Barry.—What would you give as the drainage area below Athy down to St. Mullin's?—I give it in sections. The whole is 385,440 acres.

4675. How much is it below Athy to Carlow?—I have not got it separately to Carlow, but I have it to Bagnalstown. From Athy to Bagnalstown it is 194,684 acres.

4676. How much do you think passes over Carlow weir now in time of flood?—I have nothing but Mr. Hassard's evidence on that point, as I never measured it in time of flood. He gives it 550,000 in a very great flood, but I should think that is a very rare occurrence—once in twenty years probably.

4677. I should think it could be measured, could it not, by taking the height to which the water is

known to have been reached?—I think it could. I think that is the way Mr. Hassard took it. I think he saw the actual flood.

4678. Mr. Barry.—He could do it without that?—Yes, by taking the height at which it came.

4679. Mr. Barry.—We may put it roughly that down to Bagnalstown is about half the drainage area of the drainage area below Athy?—About half.

4680. The quantity of water which was proposed to be discharged at Athy was 350,000 cubic feet, was it not?—400,000. I think that would be more. 350,000 is what I calculate, and Mr. Hassard, I think, agrees with me in that. Mr. Manning gives 400,000, and I agree with that too, but it would be more, and not a flood I would provide for.

4681. Taking it at 320,000, if you add half of that on, that comes to 480,000, which is a good deal less than floods that are now known to exist at Carlow?—This was a very abnormal flood in 1879.

4682. You cannot tell what an ordinary flood at Carlow now is, or at Bagnalstown?—No, I could not.

4683. Mr. Barry.—Was that the flood that flooded Cornwall Quay, that you have told us of?—Yes.

4684. Mr. Barry.—Then you have referred to the Loughs as reservoirs. Take Lough Neagh for the sake of argument. That reservoir is limited by the height of the weir?—Yes.

4685. It can only rise two feet, or is only intended to rise two feet?—Yes.

4686. After that the whole of the flood was meant to go down?—Yes.

4687. In the same way now when the land that is flooded above Athy is flooded all the flood has to go down?—Yes. That is what I call the abnormal and very excessive floods.

4688. How long do you think the floods remain on the land now above Athy?—There has been different evidence on that subject, and, of course, it all depends on what the state of the weather is afterwards, but, supposing the rain ceased entirely, I think in about three weeks probably it would run off. Supposing after very heavy rain it ceased entirely, I think in about three weeks it would all depart off the surface, or it may be less—it may be a fortnight.

4689. In the rainy season is it customary to have three weeks of fine weather before another rain comes?—Yes, I think I could show returns to that effect—practically fine weather.

4690. We have had it in evidence that these floods remain on the lands above Athy sometimes for months?—So they would.

4691. During any part of those months, if you got a heavy rainfall you would now get the maximum discharge; would you not?—Yes, but I do not think I ever saw, and I am often passing there when the actual flood is a foot deep over the land, that that has lasted for months. I do not think it does. I should not think it lasts more than a fortnight as a general rule. The land would be saturated and wet up to the surface, but I do not think it is acting as a reservoir for holding up water, because that would suppose a condition of things that would be very unlikely; that there would be a very excessive and continuous rainfall in the river, and you must recollect it cannot stay there unless the river is brimming over.

4692. If the land is drained above Athy, do not you think that the soil itself becomes, to some extent, a reservoir before the drains begin to run?—Very likely so. In the first rains after a dry summer when the lands are thoroughly dried, they become a reservoir, and the moment they are saturated it ceases to be a reservoir. Drainage alters the time of the flood very much.

4693. We have had it stated to us that such a work as is contemplated might increase the rising flood, but it would diminish the falling flood; the flood would rise more quickly, but would fall more quickly?—Undoubtedly; but then the amount of the maximum would be very much greater, and that proves it at

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case, because there is a shorter time to rise and fall and discharge the water. I quite admit the effect of drainage is to affect the flow of the river. Supposing the river were continually flowing at 300,000 cubic feet a minute, under the new condition of things, that river might go up to 400,000 and diminish down to 200,000 very rapidly.

4694. Do you know what the rateable value of all the mills is on the Lower Barrow?—I do not.

4695. The Chairman (to Mr. La Touche).—How many mills were on the river before the navigation; do you happen to have any record of that?

Mr. La Touche.—I do not think there is any record of that.

4696. The Witness.—Do they pay any rent to the navigation?

Mr. La Touche.—No.

4697. The Chairman.—How many mills have been erected on the river since the navigation was completed?

Mr. La Touche.—I do not think we have any details of that either.

4698. Mr. Price.—Do you think the mills there were most of them built since the navigation began?

Mr. La Touche.—I fancy most of them were built since, because they have made use of our weirs as power.

4699. The Chairman.—How many weirs have you on the river below Athy?

Mr. La Touche.—It is twenty-two, I think.

4700. Mr. Barry.—They are not all mills?

Mr. La Touche.—No.

4701. The Chairman.—How many weirs are there for the canal purposes?

Mr. Mitchell.—Twenty-two.

4702. Mr. Barry.—And how many mills are there?

Mr. Mitchell.—Ten.

4703. Mr. Barry.—Is there any public document giving the rateable value of the ten mills?

Mr. Mitchell.—No, we have none.

Mr. La Touche.—There are no mills actually working; there are mere buildings.

4704. Mr. Price.—Are there some mills that have been converted into malt stores?

Mr. La Touche.—I fancy there is no doubt about that, but the rest are a good many malt stores.

Mr. Mitchell.—There is one at Milford which has been converted.

4705. Mr. Barry.—Do you think the mills, in a general way, are prosperous?

Mr. La Touche.—I should say not.

Mr. Mitchell.—There are two old leases the company have, and in those two leases there are clauses under which a nominal rent for water power of 5s. a year is paid to the Navigation Company.

4706. Mr. Price.—The Navigation Company are the landlords of the mills.

Mr. Mitchell.—Of the water-power. There are only two cases, one at Lovinstown, and a mill at Cardow, and in only one of those cases do we receive rent for water-power.

4707. The Chairman.—You are owners of the water from Athy down to the tidal water?

Mr. La Touche.—I believe so. Our charter makes us the owners of the whole bed of the river.

The Witness.—There is one matter I ought to have mentioned, and that is in the apprehension of the silt coming down from the effect of drainage works. On the Lerr drainage there was an enormous amount of silt come down. The fall there was rapid, and the fall given, which I entirely object to in this proposed new channel, is excessive, namely, four feet to a mile, and I apprehend that if the work is carried out with a great many millions of cubic yards of fresh cutting, the Lower Barrow will be much troubled with silt. In the case of the Barrow river that was sunk, there is a great deposit of silt right in front of it. In fact they had to make silt pits and silt traps with reference to the Lerr drainage, the quantity was so much; of course that causes in a

few years, but in the first instance it is very considerable. In fact in the case of one of the mills, namely, Mr. Hauser's, to which I referred before, his mill-pond was almost filled up.

4708. The Chairman.—Of course these twenty two weirs are a great obstruction to the flow of the river?—Some of them are and some are not.

4709. And as owners of the bed of the river, and the river itself, are not the Navigation Company under an obligation to provide for that?—I should say they were not bound to do more than what was done originally.

4710. Originally the river was free and open, and all floods would have run off rapidly—at least they would not have been obstructed by the weirs?—No, but they would by the narrow channel.

4711. If by the Charter the Navigation Company are made the owners of the river, surely they have the obligation put upon them to provide for any contingency that the river was subject to before?—Yes, if the obligation was put on them at first; but I do not think they were bound to all future time to keep it in repair. If there was a deposit of silt at the back of the weir that prevented the weir acting rightly, or there was dirt on the weir which caused them to a higher level than originally, of course they would be bound.

4712. If this flood was brought down it would have the free run of the river all the way down?—I must not say that, because there are lots of level reaches, and very long reaches which the navigation has no effect on at all.

4713. Entirely free from weir?—Everywhere. I believe the whole of the silt coming down from the Upper Barrow would deposit in the Lower Barrow before it got to St. Mullin's, from the long level reaches in it.

4714. Mr. Abernethy.—The remark you made just now was to the effect that the proposed improvements in the upper reaches of the Barrow would increase the velocity of the current so as to make its erosive power considerably more than at present, and so bring down silt into the lower reaches?—Certainly, and I had direct proof of this in the case of the Lerr river again where it was desired to put a weir across to prevent the fall, and stop the silt coming, and I was able to put in a weir and throw backwater without any injury to the land.

4715. What is the nature of the bed of that reach of the river?—It is all more or less of a gravelly and fine clay—not a strong bed, but of a silty nature. In some of the cuttings it might be hard, but for that reason I have always considered it better to go in for a long level river, and then a quick sudden fall, which might be paved or converted.

4716. Mr. Barry.—Your reservoirs would cost £50,000, would not they?—Fully that.

4717. And at 5 per cent. that would be £25,000 a year?—Yes, but I should save by my reservoirs half the cutting, because I would put the reservoirs above the cutting. Supposing I made no reservoirs we should want a much larger cutting, otherwise you would not drain the lands. I propose only to cut a channel for 240,000 cubic feet, and I should save four times as much by spending my £50,000 there. I should save £200,000 in the cuttings.

4718. Still the total cost of your system comes to £414,000?—Yes.

4719. Without anything for the Lower Barrow?—Yes, but on much higher prices than what Mr. Manning calculates on.

4720. What are your prices?—My prices are practically about 1s. under all circumstances, but for the back drains a good deal less.

4721. Mr. Abernethy.—You have arrived at this conclusion, that your proposed reservoirs, which would impound water to prevent it passing down during floods, would be sufficient without embanking the river below?—Certainly; I propose to do no works below Athy.

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4722. Down to Athy I—I would have embankments and cuttings to a certain extent. I only propose to pound one-fourth part of the flood.

4723. You would remove obstacles, and not generally deepen the bed of the river, but resort to embankments instead of deepening the bed of the river generally?—Yes, I would have certain falls, so as to take in the back drains, and then run on level. I have calculated as to the necessity of putting the embankments wider from the river, but I do not think there would be any necessity further than to make them secure, because in calculating—and I have marked it on the sections I have handed in—what it would discharge with a given fall; you have 3 feet up to the surface of the land, and 2 feet more makes an ample sectional area for discharging the floods.

4724. Have you made any plans, showing the extent of embankment?—I have marked on the sections generally where I would put the embankments, and you have a copy of them. There was only one thing I should like to mention with reference to the question I was asked as to whether the land would not be a reservoir once it was dried, and that was part of my evidence in connection with the diminution of water. If it is once dry and the rain comes, it will not go down at all. I kept grass surface evaporators for some time, and I found for six months in summer, from May till October, out of 15·88 inches of rain fallings only 5·11 went 18 inches down. The whole of that rainfall was retained and evaporated from the surface.

4725. It was retained or evaporated?—Evaporated

on the grass, showing that when the ground is once thoroughly dried, it may rain for a long time before any would go into the river, but when it was saturated, the exact reverse was true. When any gales were saturated in January and February, four-fifths and three-fourths of the rain came through.

4726. The Chairman.—Is that sub-soil suitable for making these embankments?—Nothing could be better. In all that bed there is plenty of the clay from which the Athy bricks are made.

4727. Mr. Abernethy.—But for banks of three or four feet high the ordinary soil would suffice?—I had 100 miles of embankments of canals taking six feet of water, and I had no trouble with them at all for twelve years.

4728. Mr. Pies.—How long do you say it takes for a flood in the Upper Barrow to reach Carlow in existing conditions?—I do not think it would be down for a week—the full moon—provided the reservoir is not entirely filled. If the reservoir was entirely filled, I should say it would be down in a couple of days.

4729. How do you account for this statement that some of the people in Carlow made, that floods now rise in Carlow in twenty-four hours, which used previously to take four or five days?—They attribute it to the Rathangan and the Lerr drainage. The Rathangan drainage is a pretty good addition, and that is above Athy.

The witness withdrew.

Mr. J. Foster Esq. Esq. F.R.S., called in and examined.

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4730. The Chairman.—Mr. FitzGerald, I presume you are prepared to give an information upon the questions as to which we asked you?—Yes; I have read over the suggested heads of evidence, and so far as I am able to give information upon them I shall be happy to do so. As regards a special question which was put to me yesterday, I am also prepared to give my opinion.

4731. Kindly do so?—I was asked yesterday with regard to the incidence of the increased rent fixed by the Commissioners of Public Works under the Drainage Acts at the termination of the judicial term of fifteen years. The position of the parties would be this—the tenancy at the end of the fifteen years does not become a new tenancy. It remains subject to all the incidents of the old tenancy, including the payment of the increased rent, which is the judicial rent, plus the increase put upon it by the Commissioners of Works. It is, however, subject to the right of either the landlord or tenant to have a fair rent fixed by the Land Commission. The right of the landlord, of course, is limited. It only arises in the event of disagreeing with the tenant as to the amount of the fair rent. He must make a definite demand of an increased rent, and the tenant must refuse it, before he can have a fair rent fixed. The rent then fixed by the Land Commission would include both rents, and the increased rent, plus increased rent, would be gone.

4732. The Land Act provides for a periodical revision of the judicial rent every fifteen years?—Yes; it is not compulsory, it is optional.

4733. Optional on the side either of the landlord or tenant?—Yes; subject, with regard to the landlord, to the qualification I have mentioned. The landlord must demand an increased rent, and it must be refused by the tenant, before his right accrues to have a judicial rent fixed.

4734. Mr. Pies.—The new rent then fixed would include both?—Yes.

4735. And that would be the rent for another fifteen years?—Yes.

4736. Supposing the tenant had been paying the increased rent, would the improvements that were the result of that increased rent, or the result of the works

for which he paid that increased rent, be regarded as the tenant's improvements under the Land Act?—No, I think not. The case has not been decided, but in the case of *Nicholson v. Jones* (MacDevitt's Reports, 249), Mr. Justice O'Hagan laid down the law with respect to improvements executed by the landlord with his own money, and for which he charged the tenant interest as follows:—"The interest a tenant paid be paid for the use of the improvements, as an addition to the value of the land which, therefore, ought to attract an additional payment, whether it has been termed interest or not, but the corpus or capital of the improvement remained in the landlord, and it could not be said, with any rationality, that by the tenant paying interest on the outlay he had acquired within the terms of the statute (the Land Law Act, 1881), the corpus of the improvement." In my opinion that is good law and substantially governs this case, and that is immaterial whether the money is or is not advanced by the Board of Works, provided that the increased rent fairly represents the increased letting value as distinguished from the full improved value of the land, which being fixed by a competent authority it must be assumed to do. Mr. Sub-Commissioner Kane, however, appears to have taken a different view in *Lord Lansdowne's case* (MacDevitt's Reports, 128).

4737. Mr. Barry.—Let us follow that up by an example. If a piece of land is now worth, say, a shilling an acre, and suppose the improvements increase its value to £1 an acre, and that the tax on the land, by reason of the cost of the improvements, is five shillings an acre, what would be the relative positions of the parties at the end of the fifteen years?—Do you mean the relative positions of landlord and tenant?

4738. Yes?—At the end of the fifteen years, on being applied to to fix a judicial rent, the Land Commissioners would inspect the land, and fix such rent as they thought it was actually worth. The increased rent which the tenant had paid ought not, in my opinion, to be taken into account.

4739. Then at present, the landlord would continue to pay the five shillings per acre per year?—Yes, and receive his increased rent.

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4740. And the tenant would have to pay £1 a year per acre, on the assumption that the land was worth £1.—Yes, I think so. Assuming that such was the increased letting value, the Commissioners would put it upon the tenant. The entire increased value would have to be much greater to justify such an increase of rent.

4741. Take another assumption. Suppose that the occupier was primarily chargeable with the five shillings per year per acre, and that therefore at the end of the fifteen years he has paid fifteen times five shillings, the land is, in the opinion of the Land Commissioners, worth £1 an acre, but the tenant has for fifteen years paid only five shillings per acre plus one shilling, which was the original value—will the tenant, at the end of the fifteen years, have to pay the full fair value of the land in the drained condition, which we have assumed to be £1 an acre?—I think, settling aside the term of fifteen years for a moment, the tenant would have to pay an increased rent in this way.—It has been decided in the leading case of *Adams v. Denshaw* that the improvements which are exempted from rent under the Act of 1881 are the improvements works themselves, but the increased value of the lands resulting therefrom is to be dealt with as the Land Commission may consider fair between the landlord and the tenant. Moreover, in certain cases drainage is supposed to repay itself after a certain number of years; that is to say, the increased profits of the land ultimately repay the expenditure.

4742. Yes, but in a much longer time than that?—It has been held that twenty years' enjoyment of the land repays the expense of drainage.

4743. I think the payment is usually spread over a longer period than that?—Yes, but I was referring to decisions upon the Land Act of 1881.

4744. Is not that in respect of thorough drainage?—Yes; I therefore conclude that at the conclusion of the fifteen years' term, the tenant would have to pay a certain increased rent in respect of the increased value of the land resulting from the drainage.

4745. Mr. Pies.—Are not loans at present made direct to the tenant for certain improvements?—Yes, under the 31st section of the Land Act of 1881.

4746. In adjusting the judicial rent, would those be held to be tenants' improvements?—Yes.

4747. In which the landlord has no right to participate?—Well, it is to be observed that this right of the tenant to obtain loans for improvements accrues under the Act of 1881, and I am not prepared to say, positively, as the case has not yet arisen, but I think if there was an increased value over and above a fair return on the tenant's expenditure, an increased rent might be fixed in respect of it.

4748. The Chairman.—The landlord now pays the drainage tax?—Generally so; but not in the case which the Commissioner has just put. The question which Mr. Pies asked had reference to the case of an advance of money made to the tenant under the 31st section of the Act of 1881.

4749. Mr. Pies.—Under that section loans are made to tenants for certain classes of improvements?—Yes.

4750. I want to understand whether in such a case, at the end of the fifteen years' term, the benefit to the land, through the expenditure that had been made upon it, would be held to be the tenant's improvement, for which the landlord was to get no increase of rent?—I think not. For the reasons I have given the landlord would, in certain cases, be entitled to some increase of rent.

4751. Then to whatever extent the tenant has been compensated for his outlay during the period, the landlord would be entitled to receive an increased rent?—So I apprehend.

4752. Mr. Barry.—To go back for a moment to the instance I put just now; it has been given in evidence here that a certain number of years, which has been put at seven years, is a reasonable time to allow before the full benefits of arterial drainage are

attained; therefore in the case which I have supposed, the tenant would have enjoyed the full benefit of the arterial drainage for only eight years, while he would have had to pay the increased rent for fifteen years.—That depends on when the increased rent was fixed; if it was fixed before the full benefit accrued I presume it would be on the lower value of the land as it existed at the time of fixing it.

4753. Would those circumstances, in your opinion, be taken into account by the Land Commissioners in fixing the new rent at the end of the fifteen years, or are they bound to value the land at the fair rent in the condition in which they find it?—Well, that those circumstances ought to be taken into consideration is undoubted; and they are circumstances which the Commissioners are entitled to take into account. But they do not give any reason for their judgments, and I do not believe that the most experienced practitioner in the court has arrived at the basis on which they actually value improvements.

4754. I dare say you realize that this would be a difficulty that would be urged against any scheme for laying the tax on the occupier, unless the rule on which the fair rent was to be fixed was strictly defined?—I think it would be highly desirable that it should be strictly defined.

4755. Could you give us any suggestion as to the way in which you would shape the legislation for the purpose of defining it?—I am not prepared to answer that question.

4756. Mr. Pies.—Do you think if a new system was adopted for these arterial drainage loans, under which the advances would be made in the first place at the request of the tenants, and in the second place under which the tenants would repay the instalments directly to the Board of Works, instead of through the landlord, that when those rents came to be re-adjusted at the end of fifteen years, an opening would be left for a great deal of discussion and difference of opinion as to how the matter was to be dealt with, unless there was some definition at the beginning as to the relative rights of landlord and tenant?—Decidedly. Of course we have been assuming that a considerably increased value would be given to the land by drainage, which in many instances probably the Commissioners have seen would not be the case.

4757. The Chairman.—I think you stated that you had gone through the questions contained in the suggested heads of evidence?—Yes, I have read them carefully, and made notes upon some of them.

4758. Perhaps you will be good enough to go through them and give your observations upon each?—The first note I have made is in reference to the first question:—"The importance of arterial drainage to Ireland, advantage to land reclaimed." The Commissioners probably will have already found that frequently land is deteriorated by arterial drainage. Especially is such the case with low lying meadows which are subject to periodical inundations, which inundations are checked by arterial drainage. I am aware great opposition has been given, both by landlords and tenants, to schemes of arterial drainage affecting lands so circumstanced. I am certain it is within the knowledge of the witness whom I understand you are going to examine next—The O'Connor Don—because I know it actually occurred in a drainage district in which he was interested. The matter came under my notice some years ago, when I was residing in that part of the country for a short time during the vacation. Some extension of the drainage system was contemplated; but several landlords and tenants opposed it, on the ground that the low lying meadows, or "cullows" as they are called, would be greatly injured by drainage.

4759. What is the next matter to which you wish to refer?—The next question is as to the effect of arterial drainage on the climate of a district. In my opinion it has no effect whatever, practically. The influence of the arterial drainage on the climate of a district is entirely inappreciable. The reason I say so

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is this?—I was rather interested in the question, and made inquiries about it. It was alleged when the Land Commission sat, that there had been a change in the climate of Ireland lately, as compared with former years, and we were all discussing it. I went to the Royal Irish Academy, where I happened to know that meteorological records of the last century had been kept by a very distinguished scientific man—I think his name was Keatinge, the President of the Academy at that time. I tabulated those records for the ten or twelve years at the end of last century. I then went to the Ordnance Survey Office in the Phoenix Park, where they keep meteorological returns since 1855, and having compared one with the other, I found there had been no change whatever in the climate during that period in Dublin, and I assume the case is the same for the rest of the country.

4760. We have had evidence from several witnesses that if you take away the water from land, you do away with fogs, and otherwise affect the climate, and it has been stated that there has been a very considerable modification in the temperature of certain parts of Ireland—from one to two degrees of temperature, and in one instance as much as five degrees, occasioned by arterial drainage—we have had that on the authority of Sir J. Ball Greenet?—Sir John Ball Greenet may have had means of knowledge which I do not possess, but I confess it surprises me very much. If you reflect for a moment on the fact that Ireland is in the vicinity of the Atlantic ocean, and consider the enormous amount of evaporation constantly going on from it, the idea that the drainage of a district of land could affect the climate seems very extraordinary.

4761. Mr. Pies.—There is a difference between the two questions—the effect of arterial drainage upon the climate of Ireland as a whole, and its influence on the climate of a particular district?—The returns I obtained had reference to the Dublin district, and I inferred that the effect on the climate of Ireland was the same.

4762. The Chairmen.—Dublin is not one of the flooded districts?—I suppose not.

4763. What is the next point as to which you have any observation to make?—The next query is with reference to the benefit resulting from arterial drainage in the improved intercommunication by main roads, and between farms. I am not sure that I understand that, but it refers, I presume, to the improved water carriage.

4764. No; it refers to the clearance of roads by the removal of floods?—Then I shall make no observation on that. I pass on to query number 3:—“How far has advantage been taken of the facilities for promoting arterial drainage afforded respectively by (1) the Act of 1843, (2) the Act of 1863?”—The first of these must be a misprint; it should be the Act of 1842—the 5th and 6th Victoria, chapter 89.

4765. It has been all through referred to as the Act of 1843?—It should be 1842—the date is 5th August, 1842. With regard to query number 4, I think there would be great difficulty in throwing the drainage charge directly on the occupiers altogether. I do not see why it should not be paid in the way in which poor rates are borne—half and half between owner and occupier. Then, with regard to the Drainage Board, I certainly think the occupiers ought to be represented on the Boards as well as the owners. But I think it would be very undesirable, for many reasons, that they should have the control of the Boards entirely in their own hands. I dare say the Commissioners knew a good deal about the working of local boards in Ireland, and that very frequently, where the class of persons who in all probability would be elected to represent the occupiers have had the control of the expenditure, it has been the experience of the country that the expenditure has increased very much more than if it was in the hands of representatives of the owners; and therefore I think it would be undesirable that the occupiers

should have the appointment of the majority of the Board.

4766. Referring for a moment to the subject of payment, assuming that the judicial rent has been fixed, is it not the case that no increased rent, by reason of the increased value owing to the drainage, will accrue to the owner until the expiration of the fifteen years?—Of course not, if the charge is on the occupier.

4767. No; but under any circumstances, whether the charge is on the occupier or not, if the judicial rent has been fixed by the Court, no increase by reason of any improvement can accrue to the owner until after the expiration of the fifteen years?—I presume you are assuming the case of an improvement having been made prior to the fixing of the fair rent, and taken into account by the Land Commission?

4768. No, I am assuming the contrary; I am assuming that it has been made subsequently?—Three cases may be distinguished—1st, when the works are complete when the judicial rent is fixed. In this case there is no power in the Board of Works to fix an increased rent in respect of the drainage improvement, and any increased rent which they may previously have fixed would be superseded by the judicial rent. 2nd, when the works are in progress when the judicial rent is fixed. In this case the Land Commission fix the rent on the existing value of the land, and declare in their order that they do so on the basis of the landlord paying the drainage charge—in such a case there would be great practical difficulty in obtaining a subsequent increase in respect of the drainage improvement, but I incline to think the Board of Works has jurisdiction to fix one; and 3rd, where the works have been made subsequently to the judicial rent having been fixed, at the law at present stands the Board of Works has the power to fix an increased rent by reason of the improvement, over and above the judicial rent.

4769. Almost all the witnesses who have been examined up to the present have said the reverse?—Well, that is my opinion.

4770. They were not lawyers, but they all thought differently?—I am surprised to hear it.

4771. Mr. Barry.—The other witnesses said that there was no power to interfere with the judicial rent, and they put it in this way: that the landlord now is in the position of a mortgagee?—I have no doubt whatever that my view of the law is correct, and that the power of the Board of Works to fix an increased rent exists, even where there is a judicial rent. [Since the witness was examined, the correctness of his view of the law in the first and third cases given above has been upheld by the Court of Appeal in Ireland in the case of Gabbett landlord, McCutty tenant (not reported), on a case stated by the Land Commission.—J.F.V.F.]

4772. I suppose the landlord would have to collect it from the occupier?—Certainly, and he has the usual remedies as he has for the other rent.

4773. I know, but to take a case. Suppose the charge was five shillings an acre, and that half was claimed from the owner, and half from the occupier, by the Board of Works, would the owner have to collect the second 2s. 6d. from the occupier, and pay it over to the Board?—I think probably you are under some misapprehension. The entire charge is, in fact, paid to the Board of Works by the owner.

4774. I am aware of that, but I mean in fact. You say you would charge it half and half, between the owner and the occupier. What I want to know is, whether the owner in that case would have to collect half from the occupier, and then pay the entire over to the Board of Works?—I really did not consider the question who should collect it. My suggestion was, that it should be paid in the same way as the poor rate; that is to say, in the first instance by the occupier, and that he should be entitled to deduct half of it from his rent when paying his landlord.

4775. If the owner is to pay it he would have to collect one half from the occupier—would not he?—

Yes, if the owner is to pay it, but my suggestion is that it shall be paid by the occupier in the first instance, and that he shall be entitled to deduct half of it from his rent. That is the way the poor rate is done.

4774. Mr. Pies.—Can you state roughly what proportion of the tenants of Ireland have now got judicial rents fixed?—About 150,000 out of 600,000.

4775. The Chairman.—That is about one-fourth?—Yes.

4776. Are there any other points as to which you have any information to give?—Yes; with reference to the representation of occupiers, it would be very desirable, I think, that the persons they elect to represent them should be limited to persons occupying land in the drainage district.

4777. Would you also fix a qualification?—Yes, I think so.

4778. What amount of qualification would you recommend?—Probably it would not be desirable to lay down any uniform amount. There might be a power given to the Central Drainage Authority—(which of course is a necessity—you must have some central authority)—to prescribe the qualification for each drainage district, provided that they should not fix it higher than an annual rateable valuation of say £50. That would be analogous to the Poor Law system.

4781. Mr. Pies.—Would you give all the occupiers an equal voting power, or in proportion to the value of their land?—Well at present the owners vote according to the value. Yes, I suppose it should be rateable. Of course, with reference to question 10:—"What precautions, if any, should be taken to prevent drainage districts being formed in such a way as to injuriously affect other districts?"—of course there should be an inspection by the Central Authority on the formation of each district. I don't see that there is any other way of preventing that difficulty.

4782. We have had a good deal of evidence on that point, and it has been suggested that the areas should be largely increased so as to embrace practically the watershed of each river—do you concur in that?—Yes.

4783. Is there anything else you wish to state?—With respect to question 8, the benefits to adjoining districts must be very infinitesimal indeed, and it would be very hard to say how they should be made to contribute. I do not think there are any other

observations I can make that would be of assistance to the Commissioners, but if there are any questions on which they think I can afford information I shall be happy to do so, if they communicate with me through Mr. Bailey.

4784. Mr. Barry.—I cannot quite understand what you propose as to the incidence of the drainage charge; if I have followed what you have said, it was this: you propose that in the first instance it should be collected from the occupier in the same way as the poor rate?—Yes.

4785. And then that he should have a right to deduct half of what he paid from his rent?—Yes.

4786. That would result in the owner paying half the cost?—Yes.

4787. Why should he pay half the cost—is not all he would get the increased value of the land at the end of the term?—Certainly.

4788. Is not that all he would get?—No; he would get the increased rent in addition during the term.

4789. The Chairman.—That is just the point?—Yes; he would get the increased rent fixed by the Board of Works in addition.

4790. Quite so; that is the crux of the argument. If the occupier has got his rent judicially fixed, and if after that drainage works are executed, in respect of which the Board of Works direct that the occupier shall pay an increased rent of, say 2s. 6d. an acre per annum, have the Board of Works power to put that increased rent upon the occupier after the judicial rent has been fixed?—In my opinion they clearly have.

4791. Mr. Pies.—Would you expect the tenant to pay both the half cost of the work and the whole of the improved value?—No; not the whole of the improved value. They never do charge the whole improved value. Generally speaking, the proportion of the rent to the improved value is only about one-fourth.

4792. The increased rent which the Board of Works should impose on the tenant should be only such proportion of the improved value as would be fairly chargeable?—Yes; taking into consideration the ordinary tenant's profits.

4793. And having regard to the fact that the tenant would be paying half the cost?—Of course that would be taken into consideration.

#### Mr. Percy La Touche called in and examined.

4794. The Chairman.—You are the chairman of the Barrow Navigation Company?—Yes.

4795. I do not know that we have many questions to put to you after the evidence given by the engineer, unless you wish to make an observation upon the supposed injury which you may sustain from the increased volume of water being brought down the river by these drainage operations—have you anything to add to Mr. Price's evidence?—I think there is very little I wish to add, beyond what is contained in the statement I sent to you some short time ago, which is chiefly composed of extracts from the reports of the Board of Works, and referring to other drainage works which had been undertaken in Ireland, all of which tended to show that the maximum flood discharge had been greatly increased by these drainage works. In fact only the other day one of the Commissioners of the Board of Works told me that it might be laid down as an invariable rule that drainage works did very sensibly increase the maximum flood discharge.

4796. Have you ever had in the experience of your Company any legal question raised as to your liability in consequence of having put weirs in the river—your liability to prevent flooding, or to take the consequences and responsibility of flooding when it occurred?—We have had the question raised as regarded the

flooding of lands contiguous to the navigable portion of the river, which were flooded, as was alleged, in consequence of our neglect in not keeping the back drains thoroughly well cleared.

4797. How were those cases decided?

Mr. Mitchell.—Invariably in favour of the Company.

4798. Were any of them carried to the superior courts?—No; not that I am aware of. I may mention that although I have been chairman of the Company now for a period of eighteen years, I have never known any case of the kind during that period.

4799. You have never had a case at all for the last eighteen years?—No, but I know there are records of cases of that sort, and on two occasions farmers have threatened the Company with actions; but, as a matter of fact, we have always kept those back drains thoroughly well cleared, and except in very extraordinary floods they are sufficient to keep off the water.

4800. But the weirs certainly must flood the land in times of great floods?—No doubt the weirs keep back the water, and consequently spread it out on the land, but as far as we can make out, the weirs were erected before the navigation became the property of the Company. That is to say, the greater part of them were erected previous to 1791.

Jan 16, 1888.

Mr. J. Foster  
Vewy  
Pittsford.

Mr. Percy  
LaTouche

Ans. 14, 1891.

Mr. Pery  
La Touche

4801. You gave the contrary answer when I put the question to you this morning; when I asked you about the mills, you replied that they were nearly all erected since the navigation was completed.—The completion of the navigation is one thing; the handing over the navigation to the present Barrow Navigation Company is another. The making of the river navigable was undertaken by the Government of the country, so far as I can make out, about the year 1759.

4802. And your Company's charter is dated 1790?—In 1791 I believe it was handed over to the Barrow Navigation Company. The first statement of account furnished by the Barrow Navigation Company to the Government was in 1792.

4803. Were any locks completed by the Government before 1790?—Yes, the works were commenced about the year 1759, and seven locks and the cuts from them had been completed previous to 1790. But the Company attach little value to those works.

Mr. Mitchell.—I may mention that one lock was specially made by the Government to regulate the size of the boats. It was called the "Government lock."

4804. Mr. Barry.—What lock is that?—The lock at Chelmsly.

4805. Mr. Pim.—Had the works been partly executed before your Company came into existence?—Yes.

4806. And you were given an advance of money by the Government to complete them?—We were; the total cost of making the river navigable appears to have been £239,000, and the capital of the company was £50,000.

4807. Then that was a free gift to the Company by the Government?—I conclude it was. There were several grants made at different times, but the grants to the Company did not represent the difference between £50,000 and £239,000, because a great deal of the £239,000 had been expended before the Company was formed.

4808. And for which the Company paid nothing?—Yes, for which the Company paid nothing.

4809. Then that was a free gift to the Company?—So far as we can trace, a sum of £184,350 was expended by the Company, of which £35,850 was contributed by the State, the balance of £148,500 must have been provided out of the capital of the Company (nominally £50,000) and out of revenue.

4810. Mr. Abernethy.—Do I understand that the locks were made previous to the Company being established?—Yes, according to the report I have before me, seven locks, and the cuts leading from them were completed up to 1790.

4811. What report is that?—It is Mr. Manning's report to Lord Castletown's Commission on the Barrow.

4812. Mr. Mitchell mentioned one lock in particular as having been made by the Government?

Mr. Mitchell.—Yes, it is called the "Government lock." It is noticeable on being of inferior workmanship to the other locks.

4813. Mr. Barry.—How much do you expend annually on the river in the way of dredging?

Mr. Mitchell.—From £50 to £60 a year.

4814. From £50 to £60?—Yes, it just depends on the requirements of the season.

4815. It does not exceed £60?—I think not. Perhaps in some years it might go up to £80 or £100.

4816. Mr. Abernethy.—It is only at certain points of the river you require that?—Yes.

4817. Generally the flow of the river keeps it free?—Yes.

4818. Mr. Barry.—What do you consider the average depth of the navigation?—About four feet six inches. (Mr. Mitchell.)—It is not quite so much; in some parts it does not average more than three feet six inches.

4819. Summer level?—Yes.

4820. What is the width?—I could not say exactly; it varies.

4821. Would it be fair to say it is the width of the cuts which were made for navigation purposes?—I could not say.

4822. Can you answer that question, Mr. Mitchell? There are certain portions of the river made for navigation alone?—Yes.

4823. Would it be fair to say that the navigable width of the river is the width of those cuts which were made for navigation purposes?—(Mr. Mitchell.)—I think so. There is no place where there is not room for two boats to pass.

4824. Mr. Abernethy.—There were cuts made in the river for navigation purposes?—Yes; cuts were made in the bed of the river in the most extraordinary places. Sometimes they were made in the deepest parts of the river, where there never could be any question of there not being enough water. Cuts were made in some of those places to make them still deeper.

4825. The Chairman.—When we inspected the river from Athy to Ragnallstown, we observed evident signs of silting in many places, and we were informed that some of the islands had been formed during the last few years. Whose duty is it to see that the river bed is kept free from those obstructions?—If the obstructions interfere with the navigation of the river, it would of course be our duty to see that they were removed.

4826. If the obstructions interfere with the flow of the water, does it not follow that the obligation to keep the channel clear rests on the Company?—Certainly it is the duty of the Company to keep the navigable channel clear, and to keep it sufficiently clear for the water to flow.

4827. So as to prevent flooding?—Yes; but we do not quite admit that any appreciable silting of the river has taken place.

4828. When we saw the river it was evident to us that islands had been formed, and places were pointed out to us, and we were told that some of them were not there three or four years ago, and that the silt had been cut up during the last few years. The evidence was vice versa, and was not taken down, but it was manifest that there had been a considerable amount of obstruction caused by the silting?—There was some evidence on that subject given before Lord Castletown's Commission.

4829. I am speaking of what we observed during our own inspection of the river?—I know it was asserted that certain islands below the bridge at Carlow had been formed, which had not existed a few years before, but we brought forward evidence to prove that they had been in existence for over fifty years.

4830. Our observations were more upon the upper portion of the river, before you came to Carlow, between Carlow and Athy?—(Mr. Mitchell.)—The only islands I know of in that portion of the river have timber growing upon them, so that they must be at least twenty years old.

4831. The Chairman.—I think there are some not so old as that?—Perhaps so.

4832. Mr. Abernethy.—Were there any weirs or locks constructed by the Company after 1790?—Yes; because there are twenty-two locks now, and there appear to have been only seven when the Company took up the navigation from the Government.

4833. Could you specify what locks were constructed by the Company?—I could not. I have no data from which I could do that.

4834. Could you not arrive at it by specifying the seven locks which had been constructed previous to 1790?—No; the only information I have as to that is from the report furnished by Mr. Manning to Lord Castletown's Commission on the Lower Barrow. He says there were seven locks constructed before 1790, but he does not specify them, and I do not know how he derived his information.

Mr. Mitchell.—We have the records of the transactions of the Company since 1790, and we might perhaps trace it out from them.

4835. The Chairman.—I have been looking at the returns of the receipts from tolls furnished to us by the



4832. and I see there has been a gradual falling off for the last fifteen or sixteen years. Do you attribute the falling off to the increased traffic by the railway?—I attribute it more to the decrease of the milling interest in Ireland than anything else.

4833. How do you account for that? Is there any reason why the milling interest should decay?—I am inclined to attribute it largely to the importation of foreign flour. On the other hand, although the pecuniary receipts have fallen off, the tonnage has not so very largely decreased. A good deal of the decrease in the receipts is owing to the reduction of the rates.

4834. Then if the tonnage has not diminished, the decrease is not due to the decline of the milling interest?—Oh, the tonnage has decreased, of course, but not in the same proportion as the receipts.

Mr. Mitchell.—The main reason of the decrease in the financial returns is the reduction in the tolls.

4835. I find that in the year 1877 the total tonnage was 12,346 while in 1885 it was 14,884?

Mr. Mitchell.—That refers to wheat.

4836. Consequently there has been no decrease in wheat?—No; not since 1877; but the fact is that a number of the mills and malt houses along the river have shut up.

4837. Malt seems to have decreased, and barley has decreased, and Indian corn has decreased 50 per cent?—Yes.

4838. Flour appears to have increased considerably. On the whole, the total tonnage has diminished from 51,000 to 53,600—that is 2,400 tons reduction in eleven years; so that there has not been so very much falling off as regards quantity, but your receipts have fallen off in very much greater proportion—what was the reason why I put the question to you whether it was in consequence of the railway having taken away a portion of the traffic?—It is chiefly due to the reduction of the tolls. Another very important reason of our receipts having fallen off is that we handed over the business between Baginbun and Dublin to the Grand Canal Company.

4839. Yes, but as against that you receive a proportion of the tolls, which is net money to you, whereas when you carried the traffic, you had the expense of working?—Yes.

4840. That change occurred in 1879, but your receipts had fallen off before you made the change?—Yes; no doubt various causes have contributed to create the depression.

4841. I thought that perhaps the railway had taken away a portion of the traffic?—We have no means of knowing how much of the stuff in that part of the country goes by railway, but as a matter of fact I believe we cannot be regarded as being in competition, because the superior advantages the Barrow Navigation Company can afford to mill owners and people on the banks of the river, over those afforded by the railway, must make them make use of our Company.

4842. Have you an agreement with the railway company that there shall be no reduction of rates?—No, sir, we have no agreement of that sort. We had an agreement formerly as regarded the traffic between Carlow and Dublin, but when we handed over the business to the Grand Canal Company, the agreement went over with it.

4843. Then probably the agreement is now in exist-

ence between the Grand Canal Company and the railway company?—No, it has lapsed.

4844. I presume the schedule of rates which you have furnished to us is correct?

Mr. Mitchell.—Yes.

4845. I observe some extraordinary anomalies in this schedule of rates—for instance, I find that from Dublin to Baginbun, seventy-three miles, the rate is 6s. per ton, whereas from Dublin to Gorebridge, eighty miles, it is 11s.—can you account for that?—On what commodities is it 11s?

4846. Coal?—We do not do any trade in coal from Baginbun to Gorebridge.

4847. I did not say that; I say that from Dublin to Baginbun you charge 6s., while from Dublin to Gorebridge you charge 11s.—That is an all-round rate, applying to both coal and coal.

4848. The two rates appear to be for the same classes of commodities—I want to know on what principle it is done?

Mr. Mitchell.—That rate applies to either first or second class commodities; but in fact no trade exists.

4849. Do you think it a fair thing to have the same rate for two classes of commodities; is it fair to charge 11s. for coal, and 11s. for wheat?—It is for our interest that coal should be brought from Waterford instead of Dublin to Gorebridge; it is a shorter passage, and would be entirely over our company's line.

Mr. Mitchell.—The rate was in fact struck for obtaining sundry traffic to Dublin; not with the view of getting wheat and coal traffic from Dublin, because that would naturally come from Waterford.

4850. Have you any traffic agreement across the channel?—Yes, we have through booking arrangements with the Waterford Steamship Company.

4851. To what place?—Liverpool and Bristol.

4852. Not beyond those ports?—No.

4853. You have no traffic arrangements with any other companies?—Yes, we have through booking arrangements to other places.

4854. Can you give us a list of those rates?—Yes; I will send them to you. I should mention that we arrange the rates between ourselves; they do not go through the Clearing House. There is one thing I would like to say with reference to the supposed silting of the river between Athy and Carlow. Mr. Price has just pointed out to me that in Mr. Haughton's evidence before Lord Carleton's Commission he attributes any silting that has taken place between those points to the silt that comes down from the drainage works on the tributaries, the water from which empties into the river between those places. He says he can do so, by the nature of the sand, that it has come down in that way from the tributary rivers.

4855. I presume those rivers have been in the habit of bringing down sand for hundreds of years, long before those works?—Yes, but the effect of the drainage works has been to bring down more sand.

4856. Mr. Barry.—Do you contend you have a vested interest in keeping the country unimproved?—No; we do not say that, but we do say that the Barrow Drainage Commission, or whoever the Barrow drainage might be vested in, would be responsible for any damage done to the navigation by silting up of the channel or through floods.

Adjourned for a short time.

#### The O'Connor Des called in and examined.

4857. The Chairman.—I believe you are the Chairman of the River Stock Drainage Board?—Yes; I have been the chairman since the formation of the board in 1878. The Board was formed under a provisional order, confirmed by Act of Parliament in 1878, and it originally consisted of twenty-one members, which number was increased last year to twenty-eight. I should wish to ask a question before I go

into details with reference to this particular drainage district, and that is whether our engineer is likely to be examined or not.—Mr. O'Donoghue—because there are certain portions of the evidence that I think would come better from him, but if he will not be examined I should like to deal with them.

4858. It very much depends on your own statement. We do not wish to lengthen our proceedings.

Jan. 16, 1887.

Mr. Percy  
La Touche

The O'Connor  
Des.

Jan. 16, 1877.  
The O'Connell  
Ben.

more than we can avoid, and probably you may be able to give us quite as much information as your engineer?—Of course, he being a professional man, would be able to answer questions upon the engineering points, and so on, that I should, perhaps, find myself at sea about; and besides that, he would be better able to give the evidence as to the engineering points connected with the scheme than a layman; but at the same time, if he is not to be examined, there are certain points connected with the engineering on which I would give the evidence he has placed in my hands.

4862. Probably we shall be better able to answer that question when we have heard a little of your evidence, and then we shall ascertain whether there are any doubtful points arising that require explanation from the engineer?—Very well. This drainage board was formed under the General Drainage Act of 1865, like other local drainage boards in Ireland, but I think I may say that it is the largest drainage district that was ever undertaken by a local board.

4863. What is the area?—The total number of acres in the lands that are to be drained with the work is 18,000, and the length of the river and its tributaries which are dealt with under our Board is ninety-six miles; but I may mention that both the length of the river, and especially the area, has been very much altered from what it was originally proposed, because when this project was first started we proposed to deal with the whole of the district included in the catchment basin of the River Suir and all the tributaries; and the first scheme that was laid before the Board of Works included a number of tributaries, which we were subsequently obliged to drop out, not being able to get a sufficient number of assents of the proprietors. I find by the engineer's report that the area of lands originally proposed to be improved was 72,000 acres; the area of the catchment basin was 508 square miles, and included in it 363,520 statute acres. Although that is the extent of the catchment basin of the River Suir and its tributaries the area which it is now proposed to charge the work upon is only 19,000 acres; but even taking that at this very great reduction, I believe it to be the largest area that has ever come under a board such as ours. One of the difficulties connected with such a very large scheme being undertaken by a local board is that it extends over such a long extent of country, and the proprietors interested live at such very great distances from each other, that it is very hard, although the number on the board is a large one—namely, formerly twenty-one and now twenty-eight—to get a sufficient number of gentlemen to attend to form a quorum, although the quorum is only three. Again difficulties arise from different people attending at different periods, and consequently there is a want of continuity in the principles on which the work is carried out, because if a board meets at one end of the river one time, and at the other end of the river another time, you have different men, and you find it very hard, the area being so large, to carry on the same continuity in the work that you would if it were carried out under a public body.

4864. How much of the work have you finished?—According to the estimate of our present engineer, who has been at the work only for about a year, we have only done about one-fourth.

4865. What amount of money have you expended?—About half of the original estimate.

4866. What was the original estimate?—The original estimate was £94,000.

4867. And you have spent £48,000?—Then we had to calculate in addition to that which was the estimate for the works, and legal proceedings and so on, the interest upon the advances whilst the work was in progress.

4868. That £94,000 did not include interest?—It did not. But including the interest the total amount was over £103,000. We have spent now close upon £50,000. I think the exact sum we have spent is

£49,700. Before I enter upon the proceedings of the Board since it was formed, I should wish to mention the difficulties we had in getting it up originally. As I mentioned before, we proposed to take in a very much larger area, but we found it impossible to get a sufficient number of assents with regard to a great number of the tributaries, and the result was we were obliged to leave those tributaries out. If those tributaries were included in the work the amount of additional expenditure that would be necessary to carry out the drainage of those tributaries would be very small in comparison to the extent of ground that would be brought in by the tributaries, and consequently by leaving out those tributaries the charge upon the diminished area is very much heavier than it would have otherwise been.

4869. Does your drainage district commence with the sources of the river or lower down?—It commences with the sources of the river and it runs down as quite to its junction with the Shannon, but to a place called Polboy which you visited. There is one shoal between Polboy and the junction of the Shannon, which was left out of the scheme for the very same reason. The proprietors in that part of the river would not join, and with the sanction of the Board of Works it was left out. But I hold in my hand now the report of Mr. Forsyth, the Inspector under the Board of Works, who was sent down upon our petition to inspect the work before we commenced. We had, in the first instance, to subscribe amongst ourselves a sum of over £1,000 for preliminary expenses, and after we had got that sum subscribed we lodged it with the Board of Works. This sum was kept by them as a sort of security for the expenses of this survey in case the work fell through and no advance was made. Mr. Forsyth was sent down to the country in December, 1875, and he inspected the proposed project. He held an inquiry all along the river and he approved of our scheme with certain alterations. I may mention here that the engineer to the promoters of this scheme, before it was formed into an actual drainage district, was a Mr. Lyman who subsequently became the engineer of the drainage district. Mr. Lyman's idea was that a great portion of the excavation could be carried out by steam dredging, and consequently he estimated that the expense of the excavation would be very much smaller than it has turned out to be. He estimated it at 6d. a cubic yard for ordinary stiff clay and gravel—of course, not for rock. When Mr. Forsyth went down he did not seem to think that this steam dredging would be successfully carried out, and he raised the estimate from 6d. a cubic yard to 8d. and 10d.; but we found out subsequently that this increase in the price put on by Mr. Forsyth was entirely too low, and we could not get any contractor to take it at such a price. A great deal of delay in consequence arose.

4870. What is the bed of the river?—It is mainly a very hard sort of gravel mixed up with boulder stones. After our Board was formed we held our first meeting on the 13th June, 1878. The authorized expenditure was £94,000, of which £84,000 was placed to work, and £10,000 for land compensation and other expenses; and the time given us for completion of the works by the Act was six years, from the 1st January, 1878, with power to the Board of Works to give us a further extension of three years.

4871. Have they given you that extension?—They gave us that extension, and that extension we found was not enough. We not almost immediately after we were formed, on the 12th August, 1878, and we received tenders for the work; and as I mentioned a moment ago, we could not get any what I may call low, able contractor to tender at the low prices that Mr. Forsyth had laid down. But there was one tender from a Scotch gentleman of the name of Moffat, within our limit, and the majority of the Board accepted this tender. It was far and away the lowest tender. Having entered into the contract, which took some time to have perfected in a

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legal way, as soon as he got the contract passed to him he began asking us for money. It appeared that he had no money to go on with. We refused to give him any advances, and after holding the contract for about a year, we were obliged to take it from him, and we lost a year in that way. Then we took fresh tenders, and two gentlemen of the name of Woodcock and Hunt, one a contractor and the other an engineer, put in a tender at a larger amount than our estimate. I think it was \$36,000; our estimate being \$34,000, and we accepted this tender of Messrs. Woodcock and Hunt.

4872. Mr. Barry.—What date would that be?—In October, 1878. These contractors when they took the contract stated that they intended to carry on the work by steam dredging, according to Mr. Lyman's idea, and they undertook that they would place upon the river three steam dredges. They lodged a sum of money—\$1,000—as security in the Bank for their carrying on the works. Having declared their intention of carrying out the work by steam dredging, they said,—"Of course these steam-dredgers will not be ready for some time. It will take six months or over to get them put on the river, and in order not to lose time, will you allow us to begin at the work which cannot be done by steam dredging, and which must be done by manual labour; in other words, begin at the upper end of the river instead of at the mouth." As we had lost so much time already by the failure of the first contractor, we consented to this, and they set to work, apparently in earnest, in doing work on what is called the Upper Sack, there being a great fall at a certain place where I live called Chalders. We permitted them to deal with that Upper Sack without touching the river below it. Having got this permission, they were very slow in getting the steam dredgers on the river, and they worked on at this comparatively easy portion of the river until 1881. For about eighteen months they were carrying that on. Then, in 1881, having put three steam dredges on the river, but not having worked them, they came to us and they declared that their money were exhausted, and that they could not go on unless we made an advance to them. We had all through up to this time refused to make any advance except for work done, retaining all through a certain deduction of, I think it was, fifteen per cent. as a kind of security. We never paid them in full, but as our engineer certified so much work was done, we deducted fifteen per cent. from that and paid them the difference. However, in August, 1881, they came before the Board, and requested that £1,500 should be advanced to them, and declared that if this was not advanced to them they could not proceed with the works, and that they would have to give them up. The Board refused to make the advance, and on the 16th August, 1881, they became bankrupts, leaving upon the river three of these dredgers, for which they had not paid. Immediately the makers of these dredgers came down and seized them, and as it was part of our contract with Messrs. Woodcock & Hunt that any plant placed upon the river should belong to the Board, we laid claim to these dredgers, and we seized two of them. One of them was carried away by a creditor before we succeeded in taking possession of it. Then the creditors of these bankrupts, and mainly the makers of these two dredgers, made proposals to the Board that, as they were the principal creditors, they would carry on the works in place of the contractors, provided we paid for the dredgers that were placed on the works as soon as the dredgers were placed in thorough working order on the river. On the 4th October in the same year the Board passed a resolution in favour of entertaining this proposition of the creditors, and on the 1st November it was agreed, with the sanction of the Bankruptcy Court, that the creditors should take up the contract, with liberty to withdraw from it if they could prove that they had lost a sum of £1,750 over and above all payments made to them. In consideration of this they lodged this sum of £1,750

in the Bank. These proceedings took a tremendous time in the Bankruptcy Court, and it was not until nearly a year after that—the 23rd June, 1882—that the matter was completed, and in June, 1882, the second contract with the creditors of the bankrupts was signed. In July, 1882, a Mr. Bagmill, an engineer, was appointed engineer under one of the creditors, who was made trustee, and he came down to Ballinacree, took up his residence there, and proceeded to work. He did not work much with the dredgers, but with labourers, and almost his first proceeding after he came down was to demand payment for one of the dredgers, and it being certified by our engineer that the dredger was in working order, we were bound by our agreement, and paid for the dredger.

4873. Mr. Abernethy.—What sum was paid for the dredger?—£1,200. On the 30th August, 1882, the works were started by Mr. Bagmill, and from that date until the 7th November they were carried on with varying degrees of vigour. On the 7th November the first payment was made on account of work done; and then the winter floods having set in, and the work not being done by dredging, it was suspended until March, 1883. I should mention here that our understanding with Mr. Bailey, who was trustee for the creditors, was that he was to be paid for the work done at certain scheduled prices per cube yard. I can put in the prices if you like. In 1883 he claimed that he should get an increase on the rate of the scheduled prices, as they did not pay him, and after a great deal of discussion and adjournments, fearing that the contract would be thrown up, and that we should be again at sea about the business, we agreed to grant him the increase. Then the first extension of time from the Board of Works had to be sought for, and they gave us two more years, up to the 1st January, 1885, to complete the work. On the 5th August, 1883, Mr. Bailey claimed payment for the second dredger. I may mention that this second dredger, while Messrs. Woodcock and Hunt were the contractors had sunk in the river. It sunk in the river almost immediately after it was placed there. It was placed there just before the winter, and a heavy flood coming, down it went, and it had been all this time at the bottom of the river. The creditors got it up, put it together, and according to their agreement they had no right to claim payment for it until it was placed in thorough working order to the satisfaction of our engineer. On the 6th August, 1883, Mr. Bailey claimed payment for this second dredger. Our engineer refused to certify it, and on the 13th September Mr. Bailey stated he would not proceed any further with the work until he was paid for the dredger, and threatened us with legal proceedings. We then came to the conclusion that rather than go to law about it it would be better to have arbitration, and as there was in our agreement a general clause for arbitration—an agreement to submit the matter to the Board of Works or any engineer the Board of Works might appoint in case any difference arose between us—we submitted this question, as to whether the dredger was in perfect working order in accordance with the contract, to an engineer to be appointed by the Board of Works. The Board of Works appointed a Mr. Fitzgerald, who went down to the river, examined the dredger, and certified that, in his opinion, the dredger was in thorough working order. Our engineer had refused to give the certificate because although the dredger turned round beautifully, and turned the buckets all right, it did not take up the hard stuff out of the river bed, and he said—"This dredger, although it may be in perfect working order, is not in that working order that I intended. The machine to be in working order ought to do the work for which it was undertaken to be put there." However, we were bound by the award of the arbitrator, and we paid, I think it was £1,500 under that award for this dredger. The very moment that Mr. Bailey got this £1,500 he announced that he would throw up the work, and that he had lost £1,750. The contract with him was

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that he could not throw up the work until he could prove that over and above all the payments that had been made to him—because we had been paying him all through for the work he had done—he had lost a sum of £1,750. As soon as he got paid for the dredger he announced that he had lost that sum, and threw up the work and withdrew from it. We immediately called for an account of course as to how this came about, and he presented a very elaborate account showing the different losses, the payments he had made and so on. We considered that the account was of such a nature that we ought to submit it to a regular accountant, and we accordingly employed Messrs. Craig, Gardner and Co., of Dublin, recognized accountants in such matters, to watch this account, and they reported to us that the account would not stand examination, and that we should be justified therefore in disputing it. We served Mr. Bailey with a notice then that we intended to keep him to his contract, whereupon we found that it was announced in the papers that his firm, Messrs. Courtenay, Stevens, and Bailey, one of the largest firms of mechanics in Dublin, had become bankrupt; and when we considered at the time one of the most respectable and surest houses in Ireland in that department. When they became bankrupt there was an end of the matter. We could not get this work carried on by them, and they had already received, as I have mentioned, payment for the dredger. Then we had nothing for it but to endeavour to get another contract or carry on the work ourselves, and after fruitless attempts to get a contractor to carry it on on any terms that would be at all within the terms of our estimate, we determined to try and carry on the work under our engineer.

4874. Who was your engineer?—Mr. Lyman. There had been expended at that time about £31,000—namely, about £11,000 upon compensation and salaries and preliminary expenses, and everything of that sort, and £21,000 upon work and plant; that is close upon £32,000. We then commenced working under our engineer. I think it was in the beginning of 1835. The winter came on and we did practically nothing until 1835. In the spring of 1835 we commenced working under our own engineer, employing men under wages and paying them day's wages. This work continued during the summer of 1835 until September, when Mr. Lyman died quite suddenly. He, as I have mentioned, was our engineer. Then the work was suspended in consequence of his death, and also in consequence of the winter coming on. We then had to appoint a new engineer. We had to advertise for one, and that caused delay, but finally a new engineer was appointed a little earlier than this time last year. Then this new engineer had to make a report—we directed him to do so—on the whole undertaking from beginning to end; to make an estimate of the work done and to be done, and the probable cost. He was engaged at this until last spring, when we directed him to commence work, not in the way we were carrying it on under Mr. Lyman's, by day's work, but if possible by small contracts—that is to say, we got him to mark out upon the river a shoal, to enclose that shoal by day's work, and let it out to small contractors at so much a cube yard. We found it very hard at first to get this carried out in practice. We were anxious to complete the work at Ballinacree and Pailboy, which had been very nearly finished by Mr. Lyman, but we found there was a regular combination amongst the workmen there not to do anything except work by the day, and we could not get any small contractors there to take up the work; but at a place higher up the river, seven or eight miles higher up, at a place called Ballyfarnham, we got some small contractors; and, although it was contrary to the principle we had laid down before, that we would begin at the mouth and work upwards, we determined we would break through that principle, and we set the work going at Ballyfarnham, and, consequently, last June the work was commenced by these small contractors at Ballyfarnham.

4875. Mr. Abernethy.—That is just above the railway bridge?—A long way above—seven or eight miles above. The shoal near the railway bridge we could not get anyone to touch, but as soon as the work was thoroughly in hand at Ballyfarnham under this system, then the people at Ballinacree gave in, and, late in the season, about August or September, we were able to get small contractors to take up the work at and below Ballinacree, and we carried on the work in this manner by these small contractors until the weather broke and the river got flooded, and it was impossible to carry on work any longer. Mr. Coddington, our present engineer, calculates that the excavation carried on in this way costs about 1s. 8d. a cube yard, although it was originally estimated at 8d. and 10d., so that you will observe it is very nearly double the original estimate. I may mention we could not get any contractor to take it by the cube yard under, I think it was, 1s. 8d., and to contractor would take it under the 1s. 8d. unless he got the whole width of the river to do. The plan we had been adopting when we found that the estimated amount would not do the whole of the work was to do half the width all along the river, or in some places two-thirds of it; but not to do the full width all along but something everywhere, but a contractor would take the work at anything like that price if he did not get the full width, because they stated to us that it was upon the second half of the work they could make most profit. If they deepened half of the river first, and then had the second half to deepen afterwards, they would be enabled to deepen the second half at a much less cost than the first, and they expected to make their whole profit on the second half. Mr. Coddington estimates that he will be able to carry out the work at this estimate of 1s. 6d., doing only about half the original width of the river. Then another difficulty arose in this way. All these delays ran out our time, and the full amount of extension of time which the Board of Works could give us would have expired on the first day of the present year, namely January, 1837. Of course, last summer, and in fact for a considerable time before that, we saw it would be perfectly impossible to have the work done within the time. Then the Board of Works had no power to give us any extension, and we had to go to Parliament and get a private Act of Parliament passed for the purpose of getting an extension of time. This is a point on which I think that certainly the law requires alteration. The original Act was carried under what is called a Provisional Order confirmed by Act of Parliament, and consequently it was carried out, I may say, at little or no expense. The Bill was brought in by the Government as a Provisional Order Bill, and was carried as a Government Bill without any of the expenses attendant upon a private Act of Parliament; but when a local drainage board requires an extension of time the Board of Works have no power to give a Provisional Order for an extension of time, and you have to go to Parliament then for a regular private Act of Parliament, which costs, as everybody connected with Parliamentary proceedings knows, even where there is no opposition, a good deal. We had to proceed last year and get this Act of Parliament, and quite lately we have been furnished with our Parliamentary agent's bill, and it comes to something like £400.

4876. The Chairman.—What additional time have you?—We got three years.

4877. From the 1st of January, 1837?—Yes, three years absolute, with power to the Board of Works to add two years more.

4878. Then you have five years practically?—Yes, five years practically; but when we went to Parliament last summer for this extension of time we were met by opposition from some of the Irish members, who said that this was entirely a landlord board. I suppose the Commission are aware that under the Drainage Acts no one can be elected except an owner or agent, and they would not consent to our getting an ex-

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tenance of time unless there were put in the new Bill provisions for having the occupiers represented on the Board. We were, on a Board, most anxious that the occupiers should be represented, but we thought that in a private Act of Parliament it would be impossible to, as it were, change the general Drainage Law, and consequently we had not put any provision to this effect in our Bill. But after a good deal of consultation with the Government and with them, we came to an understanding that provisions were to be inserted in the Bill giving the occupiers representation, and it was in consequence of that, as I mentioned at the beginning of my evidence, that the number of the Board is now increased to 28. It was provided by the new Act that within the first week of the present year, between the 1st and the 8th of January, 1887, there should be an election held of seven members, to be added to the 21 already existing, then among the occupiers.

4878. How were they elected?—In order to get over all the difficulties that would have been attendant on a scheme of this sort being put in an Act of Parliament it was simply provided in the Bill—and I will put in the Bill—that our existing Board should by by-law regulate the mode of conducting the election, and determine who should be entitled to vote on such elections. That was one of the clauses. Then we had to draw up a regular scheme for carrying out this election; and we drew up these bye-laws, which I can also hand in, under which we determined that the electors should be those who paid rates within the district, and that the election should be held at a central place on the river on the 3rd of the present month. Then this is one of the clauses of the bye-laws:—"The returning officer shall attend and open the first meeting at Athleague at 12 noon on the 3rd day of January, 1887, and shall receive nominations of candidates up to one p.m., after which hour he shall, if necessary, proceed to take the votes as above directed." That is, he was to take the votes in case more candidates were named than the seven to be elected.

4880. Did you fix any qualification for membership of the Board?—The Act of Parliament fixed that, and it is very ambiguous.

4881. Would you consider it desirable, if occupiers became members of the drainage board that there should be some qualification?—Certainly.

4883. In order to secure intelligence and men of a certain position?—Certainly; I think they ought to be ratepayers of a certain amount.

4885. What would be the minimum assessment qualification you would suggest?—I should say that a £30 rating would be a fair qualification.

4884. Sir, Ptes.—When you say ratepayers you mean ratepayers under the general taxes, and not ratepayers to the drainage scheme?—I mean ratepayers in the taxable area; they should be ratepayers who are interested in the taxation that is placed upon the district; this meeting was held on the 3rd of January, and only seven gentlemen were proposed; they were declared elected by the returning officer, and no difficulty, therefore, has arisen with regard to the elections; but I am very much afraid that if we had had a contest, and if we had gone on to carry out the election, even after having taken what pains we could to provide a machinery for carrying on the election and taking votes, we should have been landed in no end of trouble and difficulties; we have no register of electors, and really do not know who are the ratepayers, and we have no means of enforcing the information regarding it; we have no means, for instance, of compelling any clerk of the union, or poor rate collector, to give us any information which would show us who were the ratepayers, and had paid their rates, and therefore, if we had been landed in a contest I apprehend very great difficulties would have arisen; but there being no contest, the matter has passed off quietly, and we have now seven representatives of the ratepayers upon the board.

4885. Is it not a very unusual thing for a general principle of legislation to be changed in a specific case in a private Act of Parliament?—Most unusual, and in fact I do not know of any other instance of it; I went over specially to get this Act passed and I was told by the officers of the House of Commons that it was impossible and it could not be done—that the thing could not be inserted. There is another point in connection with that which I should like to direct your attention to. Our original Drainage Act was passed as you observe by the dates, before the late Land Acts were passed; our Act was passed in 1878, and the Act of 1881 has completely changed the position of the owners of the land in Ireland; the land now is not really an owner, he is only a part owner, and the occupiers now are joint owners. It would be perfectly impossible, I think, in the future, to have any drainage scheme carried out under the old system; I do not think it would be right that the landlord should have the sole decision as to whether a drainage scheme should be carried out, and I am perfectly certain, with the present feeling that exists in the country, they would never consent to tax themselves or under themselves liable for the taxation that would be placed on their lands under a drainage scheme; so that I believe the passing of the Act of 1881 has rendered it almost impossible for any future drainage district to be formed, even a small one. At all events in a large district like the Suak it would be out of the question, and if this work had not been commenced there would not have been the slightest chance of its being taken up by such a drainage board as now exists. Then if you were to allow every occupier to have a vote as to whether the scheme was to be carried out I think that you would never get the number of assents either, because even where the number of owners was so limited as it was in the past we found it extremely difficult to get the assent of—I think it was two-thirds of the proprietors. If you included all the occupiers, they have many adverse interests and take generally very narrow views of what will immediately benefit themselves.

4886. The Chairman.—I gather from your remarks you consider it is absolutely necessary to amend the present law?—Absolutely necessary.

4887. Have you considered in what direction changes should take place?—I think with regard to all large works, such as the Suak and the Barrow, and others of that description, they must be regarded more as national undertakings than as undertakings to be carried on by any small district.

4888. And the whole of the catchment area put under one board?—The whole of the catchment area to be under one system. I am afraid you will have to bring compulsion to bear upon the owners and occupiers within the board, otherwise it will never be done. I do not think it is fair that the owners or occupiers of the very small area comprised in the absolutely flooded lands should have to bear the entire expense of large drainage works such as those of the River Suak, which benefit the country far away from the river.

4889. Has it occurred to you to examine into the question of how the taxation shall be apportioned since the Land Act of 1881 was passed—whether the landowner should pay any proportion of it, or the occupiers pay any proportion, because now the judicial rents are fixed, say for 15 years, the landowner has no further interest in the rent?—It seems to me that no one has an interest in it except the occupier.

4890. I want to know whether you have turned your attention to this?—Supposing there was a taxation of 5s an acre, and the landowner had to pay half of it, the occupier paying the other half, would the law allow the landowner to go to the Court to raise his rent which had been fixed judicially under the Act of 1881, to the extent of his payment, the occupier paying the whole benefited the drainage scheme during his tenancy?—That is a question which occurred to myself and other members of our Board immediately after

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the passing of the Act of 1881. We placed the matter before the Board of Works. The opinion of the counsel to the Board of Works was, if I recollect rightly, that the Board of Works would have the power, as they had under the existing law, upon an application being made to them to assess the increased value upon the tenant—that in fact they could deal with the tenant having a judicial rent in the same way as previously they had dealt with a man who held under a lease. The question is legally such a very doubtful one that I think there ought to be legislation with regard to it to clear it up.

4891. We have had an opinion from a legal gentleman that the additional rent could be fixed, under the Drainage Acts of 1863, quite irrespective of the Land Act of 1881?—That, as I say, is the opinion of one counsel, and there is an opinion of another counsel in another direction. That question will never be decided until there is a lawsuit, and decision of the court upon it, and it seems to me it would be far better that the question should be settled clearly by law, than that it should be left in this doubtful state to be fought out by some Board or some individual in the law courts.

4892. Both counsel, I suppose, estimate?—Both counsel estimate. It all turns upon the word "rent," and whether this increase is to be regarded as rent or not. This much I am quite certain of, that the present position of the landowners is a very unpleasant one, with regard to this matter, because we are in that doubtful condition as to whether the judicial rent can be altered, and if the Board of Works are to have the power, as they had before, of assessing the increased value upon the occupier, that ought to be done by legislation, and the matter ought to be made clear. I think I have now given pretty nearly the history of the Sack drainage project up to the present time. I have not gone very much into the engineering topics, or the points with reference to that, because I was hoping that our engineer might do that.

4893. Mr. Pies.—Did your new Act of Parliament provide for enabling you to spend a larger sum of money than was originally contemplated?—No; it was simply for an extension of time.

4894. Mr. Abernethy.—There are one or two questions I should like to put to you. I gather from your statement that your original idea was to commence the improvements of the river systematically from below, and work it continuously upwards?—Yes.

4895. But necessity compelled you to commence at the upper reaches of the river?—Yes.

4896. And subsequently at an intermediate section of the river?—Yes.

4897. Did any other engineer, except Mr. Poryth, from the Board of Works, inspect your works during progress?—Whenever we asked for a new instalment, an inspector was sent from the Board of Works. You are aware that the money we were spending on these works, as in the case with regard to all the moneys spent by all drainage boards, is money advanced by the Board of Works. They divide the original estimate into certain proportions—I forget what the proportion is—but in our case the maximum instalment they made to us at any time was £5,000. Whenever we had to apply for an instalment they sent down an inspector, but that inspector did not really go into any very detailed examination of the works.

4898. No objection was made to your commencing the work in that way, that is to say piecemeal?—No, none whatever. The Board of Works, so far as I can judge of their view by their action, do not wish to take any responsibility for works carried on by drainage boards. They leave the drainage boards to carry out the work just as they please, and to bear all the responsibility if it is badly done or well done, or whatever it might be. They will not take any responsibility in connection with it that they are not obliged to take, and consequently they do not give

the drainage boards any assistance in the way of advice as to what ought to be done. On several occasions, during the progress of this work, we requested that they would send down an engineer who would check the reports of our own engineer for us, because the members of the Board being unprofessional gentlemen, we were entirely dependent on our engineer. He told us that a certain amount of work was done and cost so much, but we had no means of testing whether that was true or not, and we thought the Board of Works might, when we asked for a new instalment from them, at our request, very fairly be called on to give us the report of their engineers as to whether the work was done that was stated to be done, and whether the cost was what it was stated to be, that is the cost per yard, of course we knew the total cost. But they would not do that, and they told us if we wanted information of that sort we should employ a special engineer of our own to check the other engineer.

4899. Mr. Pies.—Suppose a work was partly done, and the money that was originally agreed on was exhausted, are the landowners responsible to the Board of Works for the repayment of the money where the works are completed or not?—They are.

4900. Have they any power of charging anything on their tenants till the works are completed?—They have no power of charging anything till the works are completed, and there is another point in connection with that to which I intended to ask your attention. It is a very curious fact that there was no provision, so far as I have been able to ascertain, in the original Drainage Act of 1863 for winding up a drainage scheme that in fact becomes bankrupt and closed up before one or other of two things has happened, namely, either the work is completed, or the time has expired. If a drainage board, for instance, commences its work, and supposing, we will say, it has five years for going on, if, after working for six months, the owners and proprietors come to the conclusion that it is not a work that ought to be carried out, but that it would cost a great deal more than was estimated, and more than the lands would pay, they have no power of stopping the work then, excepting they merely rest on their oars and allow the five years to run out, and all this time they are liable, as I apprehend, for any actions that may be taken against them. I think there ought to be a provision which would enable the drainage scheme, if experience showed it was one that ought to be wound up, and not carried on further, to be wound up before either the completion of the work, or the expiration of the time. At present there are no means of doing that.

4901. You have suggested that there ought to be power for the Board of Works to grant a provisional order for extension of time?—Yes.

4902. Would you now propose they should have power to grant a provisional order for suspending works, and abandoning them?—I think it would be very desirable that they should have power to issue an order, on the request of the drainage board, to abandon the scheme, and apportion the repayment in the best way they could as it stood. After the passing of the Act of 1881, and after the failure of so many contractors, and the apparent impossibility of getting the work done within anything like the estimate, our Board very seriously considered at one time whether we ought not to stop the works altogether, and wind up, but we found we had no means of doing so, and then we also found that very great difficulty would exist as to the apportionment of the money we had spent, because at the time that this report that I quote from was drawn up we had spent about £32,000, and practically that £32,000 of money was thrown away, if more was not done, inasmuch as it was not done from the beginning up. All the work that was done at the head of the river was absolutely thrown away if we did not do other work below it, and a great deal of the work at Rillmaline, the lower end was

understand without further expenditure. If we had rested on our oars for the first of these years, and done nothing, and the time had expired after the expenditure of this £32,000, I do not know how the repayment of that £32,000 would ever have been allocated, or on what principle the Board of Works would have allocated it.

4903. Has the work already done in the upper part of the river injuriously affected the lands below by sending more water on them?—That is a matter of dispute. The majority of the Board, and our engineers—both the present one, and the past engineer—maintain that it has not, but some of the occupiers below the head of the river maintain that it has. I may say that there is a very great fall between what is called the Upper Suck, and the Middle Suck, of I think, twelve feet, all of a sudden, at the town of Castlebar, but above that fall we left a very large shoal untouched, so that the water should not come down suddenly on the middle part. That shoal immediately above Castlebar has never been touched in either of the rivers. The river divides into two branches above Castlebar, and on both branches a shoal has been left just before the fall, so as not to let the water down suddenly from the upper river. If those two shoals were removed the upper portions of the Suck are completed.

4904. Mr. Abernethy.—Have the works, so far as carried out, had the effect of diminishing floods?—I think they have. I live at the very head of the river myself.

4905. There it has?—My impression, remarking upon it as a layman, is that, I do not find the floods last so long as they did before.

4906. How is it in the lower reaches of the river, down in the neighbourhood of Ballinacree?—Below Ballinacree and below the Ashford shoal, above the Railway bridge, the floods run off very much quicker, and the land has not been at all so much flooded as before, but then, above that again, and immediately above Castlebar, the floods, the occupiers say, are larger than ever they were, but our previous engineer, who had been studying the river for years, and made it a study long before this Board was ever formed, mentioned from gauges he had taken years ago, that that was a mistake, and that the floods are not a bit higher than before.

4907. Mr. Barry.—What became of the £1,000 you deposited with the Board of Works?—That was repaid to us at the moment the Act of Parliament was passed. It was the very first payment made to us by the Board of Works, and that is the unrepaid portion.

4908. Did you have to pay Mr. Fosdyke fees for his report?—I am under the impression we did not, but it is so long ago I cannot answer you positively.

4909. He was sent down by the Board of Works, and you had no voice in his appointment?—None whatever, and we should have had to pay for his report if the scheme had not been carried out, because it was for that purpose the £1,000 was asked for.

4910. Mr. Pea.—You said that lands at a considerable distance from the lands now flooded were relieved or benefited, and therefore the area of charge ought to be spread?—I believed the whole catchment basin would be more or less benefited.

4911. In what way would it be benefited?—By the tolls being given for draining the lands, and I believe that those tributaries that have been cut out, through the proprietors not agreeing, will also be immensely benefited. They will have it in their power, if this work is completed, hereafter of draining their own portion at a comparatively small expense, and escape any taxation on the main river, which was the outlet to enable them to do so.

4912. Do you think they ought to have been compulsorily included in the original scheme?—Up to the present there has been no compulsion in the matter.

4913. But, under a new system of carrying out drainage works what would your view be?—I certainly think they ought. Mr. Coddington, our

present engineer, in one of the notes he gave me says had more land been included, the cost of improving it would have been far less per acre, and the expenditure would be much less in deepening the narrower streams than the main river. An expenditure of £20,000 more would probably be quite enough to be worth £10,000 yearly, and he calculates that the present improved value of the land would not pay more than 3½ per cent. upon the amount which he calculated would be necessary to finish the river. I may mention that he calculates it will take £160,000 to complete the scheme as originally proposed, and the total improved value of the land is only £5,000, which would be 3½ per cent. on £160,000, but if there were a further expenditure of £30,000 upon the tributaries, making the total £190,000, that would bring the land worth £10,000 a year, and it would increase the improved value so as to pay 5 per cent. upon the outlay. The proprietors of course in the immediate valley of the Suck that is now charged are simply at a loss by the non-inclusion of those others in the area.

4914. Mr. Abernethy.—Is that estimate beyond the £50,000 you have spent, or does it include that?—It includes the total.

4915. Mr. Barry.—Do not I gather that you are only able to complete about half the contemplated works?—Yes.

4916. Will you be able to levy the whole of the contemplated improvements?—I am afraid not. The Board of Works will charge the lands with it, but who they will make pay for it I am unable to say.

4917. In the first place the landowners will have to pay?—I presume so.

4918. And pay the whole of the charge for half the improvement?—They will have to pay the whole of the charge for half the improvement, and that is a reason why I think that this scheme is one of such a very large character that one might very fairly claim to get some assistance if any scheme in Ireland gets it. We have shown a disposition to help ourselves more than any other district in the country, and the result of our endeavours has been, I think, to show that the land in the immediate valley of the river—the flooded land—cannot possibly bear the expense of carrying out a drainage scheme of this magnitude.

4919. You said you were prepared in future to contemplate compulsion. Could you give us an idea as to what proportion of assents of proprietors should exercise compulsion over the rest?—Do you include in that owners of land as well as owners?

4920. At the present time half the total number carries the scheme if one-third do not dissent?—Yes, that was an Act which I carried myself when I was in Parliament.

4921. But in future you would make the proportion of assents considerably less. I think I gathered that from your evidence?—No.

4922. Mr. Abernethy.—What I gather from your evidence is that you would treat it as an Imperial measure, and make it compulsory on all within the drainage area more or less to contribute?—That is what I contemplated more than going in for assents or any proportion of them.

4923. Mr. Barry.—Do you mean you would have no assents at all?—I should think if the authorities on whose judgment this matter should depend considered there was any large drainage scheme of this description, that would be to a certain extent of national importance, which ought to be carried out, that then there should be a rate levied over the whole district for carrying it out, quite irrespective of the assents or dissents of the owners or occupiers, because I think, under present circumstances, if you go in for getting assents and dissents you will get none at all.

4924. The Chairman.—Can you give from your experience in Parliament any instance of any land scheme of any kind being forced on a district by the Government, supposing the whole of the occupiers and landowners of the district said we do not want it?—I think if they did say that I would not force it on them.

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4925. Then that necessarily involves another question, namely, what proportion of the occupiers and owners should be assenting parties to the scheme even if it was a compulsory one on the part of the Government?—I have not considered what the proportion should be. I do not propose that assents or dissents should be sought.—If the general feeling in the district appeared to be in favour of a scheme for a great national or provincial scheme of drainage, then the Board of Works, or such body to whom the matter should be referred, should carry it out and levy a rate unless the objections to it were raised by the parties likely to be taxed. I think there is a very great difference between getting the assents of parties to a certain particular taxation, and getting their assent to a general scheme for the improvement of the district. If you go round to men and say will you sign a paper for having your land drained subjecting you to taxation hereafter, they will fight shy of signing that, especially where you have to deal with a number of very small occupiers and not very well educated people. I do not think they will sign such a paper in any great numbers.

4926. A compulsory scheme of that kind would

rather involve compulsory power on the part of the Government?—I am speaking now of course without look, but my impression is that something of that kind was carried out with reference to the expenditure on the river Shannon—I mean as to the navigation of the river Shannon. That was a great number of years ago.

4927. Mr. Barry.—In that case sums of money were put on particular districts?—Certain sums were put compulsorily on particular districts without there being any assent of the occupiers or owners in the district.

4928. Mr. Pies.—Would you propose that the owners or occupiers of the lands specifically benefited by being relieved of water should be charged the full value of the improvements?—Certainly.

4929. And then that there should be a rate spread over the whole drainage area?—Yes, I think it would be perfectly fair that any man who could be shown to have got a distinct and definite improvement to his land, should pay to the full amount of that improvement. I think I have now given you all the information I can.

[The Witness withdrew.]

[Adjourned.]

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## TWENTY-SIXTH DAY—TUESDAY, FEBRUARY 1st, 1857.

8, RICHMOND-TERRACE, WHITEHALL.

The Commission deliberated

Feb 20, 1857

## TWENTY-SEVENTH DAY, WEDNESDAY, FEBRUARY 22ND, 1857.

THE COMMISSIONERS MET AT 32, ABBINGTON-GATE, WESTMINSTER.

Present:—Sir James Alport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq.; J. T. Pies, Esq.

J. Frederic Ladbroke Bateman, C.E., called in and examined.

Mr. J. Frederic  
Ladbroke  
Bateman

4930. The Chairman.—You are a Civil Engineer and past President of the Institute of Civil Engineers, and you reside in London?—Yes.

4931. And you were employed by the Government in examining the Shannon district?—I was in 1863.

4932. You made a report in May, 1863, and a second one in June, 1867?—I did.

4933. Mr. Abernethy.—I have here a list of the works you proposed, commencing at Lough Allen and going down towards Limerick. Would you make your observations upon each work in passing?—I do not know what has been done since 1867, except that an Act of Parliament was obtained upon my report to carry out the works which I proposed. What has been done upon that I do not know, it then went into the hands of the Board of Works.

4934. Commencing at Lough Allen, you recommended that the Lough should be used as an impounding reservoir by damming up the outlet to the present high water level?—I am not sure whether I recommended the present high water level; I recommended it should be used as an impounding reservoir.

4935. And the level was to be regulated by proper sluices?—Yes.

4936. Well, none of that work has been done?—I do not know that.

4937. That is a fact?—I recommended, on the principle of impounding reservoirs everywhere, all over the world, that they should be used for impounding the floods, and then the water so impounded should be discharged in dry weather. That would have materially reduced the floods in the upper part of the Shannon; of course, as you went lower down it would have a smaller effect.

4938. Then of course the beneficial effects that you indicate have not been carried out?—If the works have not been done they have not been.

4939. Then between Lough Allen and Battledore

you recommended the removal of a shoal and of the old bridge at Wooden-bridge, and the cutting a new channel from the outlet to a small lake below, called Lough Nagallagh?—Yes, I did; I do not know anything about what has been done there.

4940. That work has not been done?—What was your object in proposing it?—The conditions under which I had to act were very simple, although it involved a certain amount of complicated calculations to carry out those conditions. The conditions were, that I should design works which would effectually relieve the land from water, and should not interfere with the navigation. I went up the river for the purpose of determining the level at which the river would have to be maintained in flood time in order to prevent the inundation of the ground; then I had to consider what quantity of water had to be provided for so that it should not rise above that level. In doing that, it was not necessary to consider the navigation beyond the depth of the sill over each portion of the river, because the enlargement of the river which was necessary for the purpose of carrying off the flood waters, so that they should not inundate the land, you must enlarge the capacity of the river for navigation.

4941. None of those works have been carried out, so that these results which you anticipated have not followed?—I fancy from reading the reports which have been placed in my hands, that nothing has been carried out until you got to Mullick, except sluices.

4942. At Jamestown?—Well, if I remember Jamestown, that was rather a troublesome question, because of the Boyle water, which, I think, enters the Shannon above Jamestown, and the Garadise water also from Carrick-on-Shannon which is below Lough Allen, or rather wide of Lough Allen, and the Shannon down to Athlone forms a succession of small lakes; and here and there there were obstruc-



times to the free flow of water which had to be considered, and such shoals removed and such portions of the river enlarged as were too small to carry off the quantity of water which, after consideration, was fixed as the maximum quantity to be provided for.

4943. You recommended at Jamestown that the present weir, the existing work at that time, should be abandoned?—Yes, and a new one erected.

4944. Yes. "Above the bridge, with such an amount of sluices as will keep water in maximum floods down to required height. Channel below new weir may also require deepening to carry water away freely." There have been twelve sluices constructed there?—Not surely the sluices which I recommended; but certain sluices.

4945. Yes?—Because I do not see how, if I recommended that the existing weir should be removed and a new weir put in its place, and in that new weir sluices should be placed, the same sluices should be placed in the old weir. I do not know how that is at all; but you say sluices have been constructed at Jamestown; probably they have had the same effect. I do not know.

4946. They did not construct a new weir; they have simply put sluices in the old weir. Now, what was your object in recommending a new weir to be constructed?—I cannot tell you at present. I determined according to the extent of drainage ground above, which, in Ireland, they call the catchment basin, the quantity of water which had to be provided for. The sluices in all cases were introduced in order, if they were properly worked, to keep down the surface of the water at the height to which it could be allowed to rise without flooding the land; and therefore, wherever sluices were introduced into the weir the elevation of the water was taken into account, and if the weir itself was not sufficient to discharge the waters without allowing them to rise to a greater height than was desirable the surplus would be kept down by opening the sluices; and in that way all the works were laid out, each district was calculated with reference to the work it would have to perform according to the drainage ground above. Now the lands of the Shannon, if I remember correctly, is rather a peculiar basin. There are no transverse districts at all, excepting round Lough Allen to the upper part, and at the foot of Lough Derg in the lower part, until you get below Killybegs. Consequently the water which flowed off the flat land (there being very little fall in the river) set only was small in proportion, but it was a long time in getting off the ground after it once got over it. It added to the lake surfaces very materially; and of course, when I had to make a river course which would carry off all the water which might be collected from heavy rain, without flooding the land and without interfering the navigation, I had to consider what was the quantity of water to be provided for, and what was the size of channel which would provide for that quantity. If I could not do it by weir, then I had to do it by sluice; and I could not do it by sluice, unless I had a sufficient fall between the upper pool and the lower pool.

4947. Do you recollect the number and dimensions of the sluices recommended in the new weir at Jamestown?—I will look directly, and tell you what I did recommend. What I say with reference to Jamestown on page 8 of my first report is this:—"The next length to be dealt with is from Bottle Bridge to Jamestown, which includes the broad waters of the Shannon, above and below Carrick-on-Shannon, and the Boyle water as far as Knockree, at the foot of Lough Key. The level of these waters must be regulated at Jamestown. The land lies very little above the surface of the water, and a rise of eighteen inches to two feet above the height necessary for navigation floods most of the alluvial adjoining the river. Mr. Lyman estimates the land liable to inundation at 1,400 acres. In order effectually to free the lands at the upper end of this reach the water at Jamestown

should never exceed six inches above navigation level. With the weir in its present position, at the foot of a long narrow channel, half a mile in length, in which a considerable fall must exist to convey the quantity of water to be provided for, which is estimated at 350,000 cubic feet per minute, it would be difficult to reduce the water to the level required. In any case considerable expense must be incurred in altering the weir for the discharge of nearly the whole of the water by sluices, and by making the approach equal to its conveyance." I will refer to the plan, for it is so long since that I rather forget. [After referring to plan No. 8]. Now, I remember; there is the Jamestown Canal. The weir regulates the level of the water there and the water all above here. But you see there is a long narrow channel, and if I suggested the removal of the weir it was for the purpose of providing the declivity per mile necessary to bring that water home to the weir by the shorter length it would have to travel from the Broad water.

4948. Therefore you recommended the new weir to be constructed half a mile above the then existing weir?—Yes, at the foot of the Broad water; and then I see I recommended that in order to regulate the water at the upper end there the water should not be allowed to rise to more than six inches there over the level of the silt of the Jamestown Canal. That is owing to this: you cannot have a quantity of water brought in any channel without a certain amount of fall, according to the capacity of the channel so meet the fall be. It may be an inch, or it may be a foot per mile; but in order to keep down the water so that it should never rise at the upper end more than eighteen inches to two feet, which is what I said, it must be kept down six inches there, so that there shall be a fall of from a foot to eighteen inches from the upper end to the lower end to carry off the water.

4949. You will observe by retaining the weir in its old position the channel above is not only narrow but tortuous between the site of your proposed new weir and the then existing weir?—Yes; I have no doubt that the same object may be effected as a matter of calculation in another way; that you may so arrange the capacity of the sluices, if there is fall enough below the weir, that the sluices themselves will discharge the quantity of water without enlarging the channel, under the condition that there is a greater fall there than I think desirable. How far that has been carried out I do not know.

4950. There have been twelve sluices constructed. We have not got the dimensions of them. I was asking you whether you could give us the number and dimensions of the sluices suggested?—Yes.

4951. Mr. Barry.—The dimensions are all stated in General Sankey's report?—They would be in my second report.

4952. Mr. Abernethy.—Now, I want to know what you recommended in that new weir?—Four sets at 2700 each, six feet square, or six by six. It depends entirely upon the pressure that can be brought to bear upon them, and the quantity of water to be dealt with. I see at Jamestown there are four sets of sluices at all events.

4953. Mr. Barry.—This is what has been done—"Twelve valves each 6 ft by 6 ft."—Well, I cannot tell. Very likely that would answer the purpose of the works which I recommended.

4954. Mr. Abernethy.—The capacity of those sluices being probably greater than you recommended in the new weir?—If I only recommended four sets of sluices 6 by 6, that is 36 square feet, and they put twelve sluices 6 by 6, that is twelve times 36 against four times 36.

4955. Then probably that would effect the same object?—Very likely, but I cannot say without going into the calculation, because it depends upon the size of the channel, the quantity of water to be dealt with, and the size of the channel. If it is agreed, for instance, or understood, that the quantity of water

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Lancaster  
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which I assumed would have to be provided for, then it would be a question as to whether the capacity of the channel up to those sluices would discharge the water or not with the facility which could be allowed it.

4556. Going further down at Rosaky, you recommended that provision should be made to discharge by sluices, or other mechanical means, 500,000 cubic feet per minute!—At Rosaky provision 1996 ft. made for the passage of 440,000 cubic feet per minute, but the ability to grant relief here depends upon works to be executed at Tarmaherry, the fall being so small between the two, that at present the weir at Tarmaherry throws the weir at Rosaky into backwater. I will, therefore, take these two places together. Between Tarmaherry and Jamestown the land to be relieved, according to Mr. Lysons, amounts to 1,150 acres. Above Rosaky the water must not be allowed to rise more than six or eight inches above the summer level at the weir. To carry these arrangements into effect, the bulk of the water at Rosaky must be discharged by sluices or other mechanical means, and the whole of it, say 500,000 cubic feet per minute, must be discharged in this manner at Tarmaherry. That is at Tarmaherry, without any alteration in the weir, the whole of the water would have to be discharged by sluices, so that the water of the summer level, which I see is very small as compared with the flood waters which had to be dealt with, would only pass over the weir, but whenever there was more than a summer quantity of water it would have to be discharged by sluices, so as to keep the water down.

4557. Twelve sluices have been constructed at Tarmaherry, but you recommended in addition that the channel should be widened between Tarmaherry and Rosaky to 250 or 300 feet!—That was all the result of a calculation. If the quantity of water which I assumed is provided for, and the lands must not be flooded, you must have a channel large enough to convey it.

4558. No works have been done in widening that channel!—Well, I cannot tell without going into the calculation as to whether the effect of the sluices alone, without the widening of the channel, would do. They might not. *Præsumptio* they would not, because what you do is to create a very rapid current in a narrow channel above the sluices, but you want to have only a very slight declivity per mile to free the lands from water, because the rise of a few inches in the Shannon is just as bad, as far as the destruction of a hay crop is concerned, as if it rose five or six feet.

4559. The channel has not been widened or deepened as you recommended!—Of course it runs sooner off the ground, but if a summer flood occurs and destroys the hay crop, a few inches for a day is as bad as five or six feet for five or six days. I cannot tell how that might be. I have no doubt sluices would do good; but whether they would do all the good that was contemplated, I cannot at present say.

4560. Without widening and deepening the channel above!—No.

4561. Tarmaherry Bridge, the next work you recommended, was to be improved by the removal of an island and shoals. Now there they have constructed twelve sluices!—At Tarmaherry are the last lock and weir, before we arrive at Lough Ree, and there is always a clear and sufficient fall over the weir. Here the water must be kept down, so as not to rise above the height of the present weir; and each relief must be given in the river above as will prevent its rising more than two feet above the Tarmaherry level at Rosaky. Between Tarmaherry and Rosaky various shoals have been dredged out, or excavated, to a snuffing channel of 150 feet in width. Three must be widened to 250 or 300 feet, and above Rosaky another set of thirty-five feet span must be added to the existing one over the Corran Water, and the approaches properly cleared out and deepened. At Tarmaherry Bridge the approaches must be improved

by the removal of an island and shoals, and other impediments, which now obstruct the passage of the water.

4562. In place of that twelve sluices have been constructed in the weir!—I forget whether the bridge was above the weir or below the weir.

4563. The Chaircases.—The place where the sluices are marked is distinctly below the bridge. You will find it on No. 6 plan. I see, according to this plan, the island that you propose to remove forms part of the foundation to the bridge!—That I cannot say. As to the quantity of water, which, after consideration, I determined would have to be dealt with, every point upon which alterations were proposed was carefully considered, and I should not think that I should propose the removal of an island on which the piers of a bridge were constructed, without due consideration.

4564. Mr. Abernethy.—You recommend that the approaches should be improved above Tarmaherry Bridge. That has not been done!—Then I supposed at that time they ought to be, and I know no reason to alter one's opinion if the quantity of water to be dealt with is assumed. I always felt this—the channel of the Shannon was too small. You had to enlarge the pipe and if you did not do it effectively somebody would complain; and it has been stated that the improvements that had taken place near Carrick-on-Shannon had actually been injurious, because they tempted people to cultivate crops which could not possibly be cultivated, and you run that risk in this way. If you partially improve the river so as to induce people, after a series of dry years without a flood, to put a crop in the land and to till the land where they had never tilled it before, when a flood descends it does them more mischief than it would have done if they had been left alone.

4565. Referring to the tributaries of the river Corrib and Fallon you recommended that they should be "embanked and the land waters conducted by a back drain through the ridge of land at Glendora to river below Tarmaherry!"—At Tarmaherry, I think, in my second report there were some alterations after my first report which further re-examination of the country, and calculations, and so on, induced me to make. "At Tarmaherry the embankments, and works which were projected for preventing the flooding of the land adjoining the river Corrib, say by other arrangements, be dispensed with." I do not know what those other arrangements would be. That report is twenty years ago. But whatever I recommended would be shown on the plan which accompanied the report of 1847, because I find that in another place I say that I sent plans.

4566. They are in Dublin. In the case of the Corrib and the Fallon you recommended our English system, the construction of embankments instead of widening and deepening the channel!—But what was my final recommendation with reference to that? My first report is no doubt tolerably correct; and absolutely correct as regards a great many points; but with reference to particular details of construction, the carrying out of what are the essential and correct features of the report, subsequent consideration and examination might lead me to make a variation, as it did in three or four cases. Tarmaherry was one of them. What I recommended as a desirable plan, when I made my first report in 1843, I did not consider so desirable a plan as another which I recommended in 1857, and which is, no doubt, shown on the plan which accompanied that report.

4567. These plans are in Dublin. I suppose in this case you recommended that instead of deepening or widening the existing channel of the river, the flood waters should be carried off by embankments constructed, probably, some distance from the margin of the river!—In the 1857 report I recommended that.

4568. What is your opinion as to the possibility of it?—What I say in my report of 1847 is, that at Tarmaherry the embankment I recommended in 1843

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should be dispensed with, as there would be other means of discharging flood waters.

4969. Nothing has been done with regard to these two tributaries, either by embankment or otherwise?—Well, of course, I was desirous of doing as little work as was necessary to carry out my instructions effectually.

4970. It was evidently a work of some magnitude that you recommended, because your estimate for it is £27,000—the works necessary for these two tributaries.

4971. Mr. Barry.—The embankments of the rivers Camble and Falloo are put down at £4,156 in the first report?—I am looking now at the estimate in the second report, which gives all the details. There is an embankment in the second report.

4972. Mr. Abernethy.—Had you any reason for changing your views as regards the formation of embankments to these rivers?—I cannot tell excepting if I left the embankment out in my second report, I thought the plan I then proposed, after further consideration, was a better one than the one I first proposed. I cannot tell you the reason. It was simply another way of effecting the same thing.

4973. What is your opinion in cases where it is difficult to deepen the bed of a river—say a rocky bed in which there would be very great cost in deepening it, and where the formation of embankments like those in Lincolnshire is possible?—Well it is a matter rather of local consideration. If you put an embankment alongside a river, you impound the water behind the embankment if it cannot get away, and you may do so much mischief by preventing the river overflowing, by making another reservoir by means of the embankment, as if the river itself overflowed, and then it becomes a question of calculation. I see in one place, General Smiley suggests that by making a wider and shallower excavation he might reduce the expense. My experience rather is that that is the way to increase the expense—that if you can get the water off, which is the great difficulty, the greater the hydraulic mean depth, the cheaper you do the work, because you get less "wetted side," if I may use the term—less friction by the water—in a deep channel, than you do in a shallow one. Say you have 100 yards wide and one yard deep, in one case, and you have 10 x 10 in another—you have 102 yards in the one case, against which the water has to rub itself, and in the other you have three times ten—30 yards. You have a friction of 30 yards against 102; and you have to go into all these calculations before you can decide which is the cheapest way of doing it.

4974. If you deepen simply a small section of a river, and, below that section which you deepen, you have a less sectional area, it is necessary to dredge the river generally throughout?—No doubt, or else you make a pool.

4975. In case it is difficult to dredge a river from its being a very hard bed, and a matter of great cost to carry out—the general deepening of a river from its embouchure to its source, for the purpose of drainage—can the same object not be effected by the construction of embankments and wash lands?—It is all a matter of calculation upon the locality. But supposing you take the deepening of a river only, and you take the two cases which I have supposed, you can afford to pay three and a half times as much per cubic yard for the deepening of a river as you can afford to pay for the excavation in a wide shallow river, to my notion of the land you take. You take 100 yards instead of 10 yards wide, and if it cost you 1s. a cubic yard to excavate the 100 yards, you can afford to give 3s. 6d. for excavation 10 yards deep.

4976. But in order to effect thorough drainage it is necessary to improve that river throughout continuously, not in sections?—Well, it is necessary in this way, that if you have a large sectional area through which the water may go, the whole of the water is in motion, and you require perhaps only an

inch or four inches of fall in a mile. You come to a very narrow part where the sectional area is small, and there you require forty inches instead of four inches per mile. Therefore you must take it in that way; you must increase and enlarge those portions of the river through which the water cannot pass without a declivity beyond that which it is desirable to have.

4977. Coming back to the question of cost. Supposing that the general deepening of the river involves an expenditure which cannot be provided for, would not the construction of embankments and wash lands, so far as the floods are concerned, effect the same purpose with back drains?—No, not in the Shannon. The basin of the Shannon is so level that if you could construct an embankment on each side of the river the water which comes in from the sides would impound behind these embankments. There is only four inches of fall in the mile in certain portions of the Shannon.

4978. I was putting my question not with reference to the river Shannon, but in this form:—Supposing that it is necessary, according to your opinion (and I quite agree with you) that you must deepen the river generally to effect the purpose of draining and discharging the water, you must equalize the sectional areas, increasing them towards the embouchure, but you must do it generally, it will not do to excavate a small portion of the river, and leave the portion below—it must be a general improvement?—No; I must answer that with a certain qualification. You do not by any such operation decrease the declivity or fall per mile, which is required in the contracted part; but if you enlarge a portion of the river, whereas perhaps the fall required was six inches per mile, you may reduce it to four inches by reason of the larger sectional area at that particular point.

4979. Supposing the case of a river with considerably more fall than the Shannon has, and a very hard bed, where it would be exceedingly costly to dredge through its whole length, could not you effect the purpose by the construction of embankments and wash lands?—I will not say it would not be possible, because that depends upon local circumstances. Generally in the case of the Shannon I should not think it would be possible.

4980. But setting aside the Shannon?—No doubt in many rivers embankments are a cheaper thing a great deal than the deepening of the river. There are many cases in which you cannot deepen the river, in which case in order to make the sectional area large enough to pass the quantity of water, you must do it by embankment. But I do not think the Shannon would admit of any general system, I will not say it will not admit of embankments at all in any part of its course, but I mean to say you could not adopt as a general system the system of embankments against excavations.

4981. In the Shannon?—In the Shannon.

4982. I am speaking of rivers having a greater fall than the Shannon, where it is almost impossible to dredge the bed?—You may do it in many ways in rivers which have a greater fall. That may be the slope of the river (explaining on the drawing), and the water may rise to that level, and flood the land. Put an embankment there, and make a back drain to take off the water which comes from there. But then you have to calculate the quantity of water in the lower reaches, which comes from the upper reaches in the case of the Shannon. Then the size of the back drain would have to be determined with reference, not to the quantity of water which would be in the river before it arrived at that place where the embankment began, but to the quantity of water which would arrive at the river over the land which would be drained by the back drain. You must provide for the quantity of water which comes down from above. At Tarnonbarry it is put down at 500,000 cubic feet; but if you have that quantity at Tarnonbarry, and at Roskilly 450,000, you have then 950,000 cubic feet coming into the river between

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Boosky and Tarmoharry. Of that 50,000 cubic feet per minute there is 25,000 cubic feet we will assume on each side of the river which would have to be provided for by a back drain on each side of the river if you made an embankment. I will not say it cannot be done. I was very busy making embankments at the time I was considering this question.

4963. In what part of the country?—In the island of Majura.

4964. Do you know the Danube?—Yes, I know the Danube.

4965. There is a considerable system of embankment throughout the Danube?—I know the Danube at several points; I know it between Baschlach and Bostchuk.

4966. Do you know the Danube at Vienna?—Yes.

4967. Are you aware that embankments have been formed there to carry off the flood water a considerable distance from the margin of the river?—I do not know much of the river there; I do not know what has been done.

4968. What has been done there is this?—That is the usual channel of the river (explaining). Embankments have been formed with wash lands on each side to provide for the discharge of the flood water?—Yes; a very common plan.

4969. It has been effective there?—Yes; it is a very common plan. It is done constantly in this country. The water which comes in from the basin, which forms the basin of the Shannon behind those embankments, would have to be provided for. That could only be provided for where the fall is considerable. Where you have only four inches of fall in a mile, it would require a very long back drain, and then you have the fall in the back drain; and the less sectional area you have the greater the declivity you require.

4970. But in rivers of a different character from the Shannon with a much greater fall, where it is practically impossible, as a matter of cost, and for other reasons, to enlarge the channel of the river, embankments could be formed to provide for floods with back drains; that has been done, as you say, in this country?—Yes; and I dare say there are cases on the Shannon in particular places where that system might be adopted.

4971. Where the fall is greater?—Where the fall is sufficient for it.

4972. Having regard to the question of cost, and the great difficulty in dredging the bed of a river throughout, as a general question, irrespective of the Shannon, would you approve of the system of constructing embankments?—In many cases embankments would be the cheapest way of doing it; in many cases excavation of channel would be the cheapest way of doing it. It is impossible to give an answer, yes or no, to that question without qualification, because it depends upon local circumstances.

(Adjourned for a short time.)

4973. "At Athlone," you recommended that—"water must be discharged by sluices or other means at Athlone weir, so as not to rise above seven feet over all, which will allow three inches to go over the weir." Well, they have constructed fifteen sluices there. Then, "at Shannon Bridge," you recommended—"additional facility for passage of water may be given by cutting away portion of the island which now obstructs approach—finders to seek of bridge." Nothing has been done there, the obstructions still remain?—If I remember right, that portion of the river is very sluggish—there is scarcely any fall in it—that centre part of the river between Lough Ree at Athlone and Portanna, has very little fall. Shannon-bridge is about half way, I think.

4974. Yes. That was evidently an important work, because your estimate is £50,000 for it?—I think, if I remember right, that the largest portion of the flooded land is in that reach too.

4975. Yes?—And therefore, inasmuch as my

attention was specially directed to the removal of the floods which would do damage to land liable to be inundated, I laid out such works as would effectually secure such lands from inundation; and if the fall is very little, it is of course, a matter of absolute necessity that every facility should be given that could be given for the passage of the water.

4976. Nothing has been done there, and I think the lands are flooded at the present day?—I am quite sure that at the time I made that report, if I remember that, I thought it was necessary to be done. I see from Athlone to Shannon-bridge there is only eighteen inches of fall, and the distance is nearly fifteen miles. Therefore, any obstruction of Shannon-bridge would be most important with reference to the reach above—most important.

4977. Having regard to the small fall of the river there, and the obstructions which exist in the bed of the river, you consider that was a very important work?—Yes. Of course, the existence of a very small fall indicates prima facie that the channel is large enough for the conveyance of the ordinary water, with a very small declivity. But then it follows also, that if the land is flooded above where the fall is so very small, the rise of an inch or two would flood the whole land. It is very important that at the foot of that section, in which the declivity is so small, every obstruction should be removed.

4978. At Meelick you had two schemes, one in 1863, which you modified in your subsequent report?—Well, I must take the subsequent report, because that was after a great deal of deliberation. I think there is an alteration here with reference to sluices, which is rather important. At page 2, of my second report, I say:—"It is obvious that if nothing more were done, such a reduction in the sectional area of the channel through which the water would have to pass, would require a greater velocity to convey the same quantity of water through the smaller channel." That is to say, if sluices were introduced so as to keep down the water, the area of the channel would be smaller hereafter than it was before; and in order to pass the same quantity of water it must go with a greater velocity, and it could only go with greater velocity by an increased declivity. Therefore I say:—"It is obvious that if nothing more were done, such a reduction in the sectional area of the channel through which the water would have to pass would require a greater velocity to convey the same quantity of water through the smaller channel. This increased velocity can only be obtained by increased declivity, and it therefore follows, that the mere introduction of sluices, while it would relieve the lands immediately above the weir, would gradually lose its effect as the distance increased, and would produce little or no benefit in the upper portion of a long reach, while at the same time it would so increase the velocity of the stream as injuriously to affect the navigation." That is rather an important point in considering the thing—that if you merely introduce sluices and do nothing else, you reduce the sectional area of the channel through which the water has to flow, and although it would relieve the water immediately above, by the reduction of the area by means of the sluices, the necessary increased declivity would very soon run itself out in such a way that the upper portion of the reach would not be benefited at all. And possibly, as I say here, you may so increase the velocity as to injuriously affect the navigation.

4979. I have already stated that nothing has been done in the way of removing the obstacles at Shannon-bridge. The river Suir runs in close there, you will remember?—The obstructions there consisted of the manner in which the water approached the bridge. There was an island at the upper side of the bridge, and I proposed that that island should be removed. I am sure I do not know what else I proposed, but the removal of an island would hardly have cost £50,000, and therefore, I conclude there must have been other works.

5000. The Chairman.—You see there is a sharp curve in the river where the Suck runs fast—Yes, and I proposed to cut off the curve.

5001. Mr. Abernethy.—And nothing has been done. Now, what is your opinion as regards the effect on the drainage of nothing being at that point?—I think it is one of those works that might or might not be undertaken. The object of the alteration I proposed here was for the purpose of preventing obstructions. From Shannonbridge to Athlone there are evidently not many obstructions, but immediately below Shannonbridge in, once the river Suck, and that forms Bishop's Islands, and there there is an obstruction. Now, of course, if you reduce the level of the water at Bishop's Island, you reduce the level of the water at Shannonbridge, and so upwards.

5002. Mr. Barry.—And also in the river Suck?—Yes; well, I never went up the river Suck, but if I remember rightly, it has a considerable fall.

5003. Mr. Abernethy.—At the upper reaches there is a considerable fall in the Suck, but the lower reaches have very little fall—I cannot tell what the effect would be on the river Suck, but of course if you reduce the level of the water at Bishop's Island you reduce the level to nearly the same extent where the river Suck joins the Shannon. How far that reduction would extend up the river Suck I do not know.

5004. Mr. Barry.—To whatever depth you reduce the level of the water opposite the outlet of the river Suck, would be a benefit which might be taken advantage of for improving the river Suck?—It would not necessarily be an advantage, because if you leave the river Suck the same channel it has now, and reduce its level, you will reduce the sectional area of the Suck, and that would be rather a disadvantage than advantage.

5005. I say it is a circumstance which might be taken advantage of in dealing with the river Suck?—Yes, it might be.

5006. I mean it gives you the opportunity?—Yes, as doubt.

5007. Mr. Abernethy.—I see you had two schemes at Mellick, and you preferred the second one?—Yes.

5008. You recommended "a new weir at Banagher"; the removal of the existing weir at Mellick; the opening out of old channel; and deepening shoals in river where required." And that, I see, involved works amounting to £26,050?—Yes.

5009. "Thirty sluices constructed; new channel 150 feet broad, with two branches, the united area of which is same as that of the main channel." That has been carried out—but that is not exactly what you recommended the carrying out of?

5010. Has it relieved the land above?—Yes; my fear always has been that a certain amount of relief would be given, and not full relief—that there would be always ground of complaint, and that flooding would occur some time or other when they did not expect it, and do a great deal of mischief. Then the people complain bitterly.

5011. You also recommended a work of inferior order at White's Ford, namely—"Excavation and improvement in river; clearing out entrance to old channel, including land required." That involved an expense of £4,000, and that has not been carried out?—Well, but now let me understand. I have never been there for the last twenty years, and I do not know what it is like. Have the excavations of shoals and narrow channels which I recommended been carried out there, or have sluices only been introduced?

5012. In several cases sluices have been introduced without the other improvements—I cannot believe that sluices any more than the actual removal of the weir would do very much good, except immediately above the sluices; at a distance they would lose their benefit. It is only by enlarging the channel and so

reducing the necessary declivity, together with sluices which would keep down the level of the water at the upper end, that you can hope to do much good. The mere introduction of sluices, although it might do good to land immediately above, would not necessarily do any good to land at a distance.

5013. Mr. Barry.—The Board of Works have carried out a cut at Mellick, but that is the only deepening or excavation of the river which has been carried out?—To the extent to which they have carried it out it would be beneficial.

5014. They spent nearly £31,000 upon that cut?—I am afraid I cannot look at the question as a mere matter of pounds, shillings, and pence. If the object is to attain a certain end, whether it cost £1 or £1,000, that end must be attained. They may have spent £31,000 very unwisely, or very wisely, for anything I know.

5015. Mr. Abernethy.—Now we have got as far as Killaloe?—What I there proposed was to introduce sluices to a great extent. At Killaloe you receive all the drainage of the whole basin of the River Shannon above Killaloe, and I determined that the quantity of water in a big winter flood was nearly 2,000,000 cubic feet per minute. I provided for passing off 1,000,000 cubic feet, I think it was.

5016. That was so in your report?—Therefore there would still be occasions (if both these calculations were right), although not very frequent occasions, upon which the floods would overpower the means of discharge, now to a very great extent Lough Ree and Lough Derg, if it were not for the navigation, might be used as impounding reservoirs; but it is clear that if you used Lough Ree and Lough Derg as impounding reservoirs, having regard to the maintenance of the navigation, you have only a certain film of water at the top between the minimum depth and maximum height of floods to which you can go, and therefore when the flood is coming in at the rate of 1,000,000 cubic feet of water per minute, it would soon overpower even that means of impounding; but if you could use Lough Ree and Lough Derg for the purpose of impounding only, without reference to the navigation, you would do a great deal towards improving the river.

That is a very important consideration?—I think Lough Derg is sixteen or seventeen Irish miles long, and Lough Ree something like twelve; so that, taking the case of Lough Derg, of course you would reduce the whole surface, if you reduced it at Killaloe, to the head of the Lough, which is at Partanna.

5018. At Killaloe you recommended, in the first place, alteration in the weir?—Yes. Then you must also consider that a great deal will depend upon the manner in which the sluices, if constructed, are used. You may overpower the river below. I had to keep in view that whatever works were projected they should not injuriously affect any lands below, and if you were to discharge the water at Killaloe, without reference to the height to which it might attain below without doing damage, you might create mischief.

5019. Your recommendation was that the condition of the approach channel from Lough Derg to the weir should be improved, so as to keep down the surface at Lough Derg?—Yes, and if I remember right there was an embankment between the entrance to the canal and the lake, and in that narrow part there was a considerable fall. If that embankment were destroyed then you would have the level of the water at the lower part of the canal at the same level as the lake.

5020. You further recommended the removal of the arches of the old bridge, and the substitution of arches of larger span at Killaloe—that is below the weir?—Whatever I recommended below the weir would be in consideration of the excessive floods, which so rise in the river below Killaloe as to overpower the level of the weir at Killaloe and flow back into the lake. Therefore it was necessary, in order to

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make any works which were projected at Killaloe effective, to take care that there was sufficient fall below the weir to carry the waters off.

5021. As regards the navigation of Lough Derg, what depth of water do you think would be required to preserve that navigation? We are told that the boats draw four feet six inches of water?—I will not give an opinion upon that—it never formed part of my reference. I was required to lay out works which would have the effect of completely freeing the land from water, and in such a way that the navigation was not to be injured. Therefore I was obliged to take what existed, and whether it was six, seven, or eight feet, or whatever it might be, that depth I took. It so happened, if I remember rightly, that in making the channel large enough for the conveyance of the floods, I had no occasion to alter the depth in any way upon any of the cuts.

5022. But if the boats which navigate Lough Derg draw from four feet six inches to five feet three inches, would you think it necessary to preserve a navigation twelve feet in depth?—I will not answer that question quite at once, because so much depends upon local circumstances. A navigation like the navigation of Lough Derg, which is about eighteen Irish miles long, is quite a different thing from navigation upon such a canal as the Ulster Canal, and there is a considerable fetch in windy weather across Lough Derg, which is twelve or thirteen miles across. Therefore the height of wave and the depth to which a vessel must go has to be considered with reference to the difficulties it has to encounter in its passage, difficulties which do not exist in a narrow channel. Therefore, one has to consider the circumstances under which navigation may be continued. And these considerations, I have no doubt, operated upon the minds of the original commissioners who carried out the Shannon works, because the locks are of different widths, and of different lengths, and of different depths over the sills—the one is a lake navigation, and the other is canal navigation.

5023. Take the instance of a bar such as the Mersey, upon which there is a considerable sea sometimes. Vessels pass over it with much less water under their keel than seven feet to spare?—Yes, but that again depends upon the width. You want less water in a very wide channel than in a very narrow channel. A vessel drawing three feet would touch the bottom where there was only four feet six inches in a narrow channel, whereas a vessel drawing three feet on a wide sheet of water will not touch the bottom at all if there is four feet six inches under it.

5024. Mr. Barry.—Have you seen this paper of General Sankey's?—Yes, I have, and studied it.

5025. The general drift of this paper is that an expenditure of one hundred thousand pounds might be very profitably made?—Yes.

5026. Can you give us any opinion as to whether, in your judgment, such an expenditure would be made with advantage?—With advantage—yes. I think you could not spend one hundred thousand pounds judiciously upon the Shannon without conferring an advantage; but whether it would do all the Shannon requires is another matter.

5027. On page 4 you will see the distribution of the works which General Sankey proposes. The first item is for an embankment at Lough Allen?—Yes. I observe there, that General Sankey considers that no compensation will have to be paid for submerging land between summer water level and winter water level. My experience, which is tolerably large on that point, is that compensation would be required and would have to be paid. It is not a very large sum.

5028. That would only add five pence to the money, it would not effect the engineering advantage of the work?—No; I think it there adopts my recommendation, that Lough Allen should be used as an impounding reservoir, which I think is very desirable.

5029. Then the second point is, that he recommends an excavation in the river to Battle-bridge, which I

think, answers to some extent, to what you recommended?—I did recommend alterations at Battle-bridge; but of course the outlay there may be postponed for other outlay which may be more beneficial, if you make Lough Allen into an impounding reservoir; because if you make Lough Allen into an impounding reservoir you do not require so large a channel at Battle-bridge as you would do if you do not.

5030. The next work he recommends is excavation between Jamestown and Tinnisherry and the improvement of Charnock bridge, for which he puts in an expenditure of £14,500. I think we may take it, that all these are works which you recommended?—Very likely.

5031. Then number 3 is an excavation in the river down to Achlone, £7,000. That, I presume, also would be work which could not do any harm?—Certainly not any harm; if it is enlarging the channel it would do good. It would do good in this respect, that it would reduce the height to which the floods rise, and very frequently prevent a flood. For instance, if a flood were kept down seven inches where seven inches could do mischief, it would prevent that mischief being done.

5032. The next item is "Excavation at Sharnam-bridge and Bishop's Island and in the river some below it, to the junction of the Grand Canal, £25,000." That, although it is less than your estimate, would be all tending in the same direction of enlarging the channel?—Yes.

5033. The same with regard to the fifth item—"Excavation of river between Banagher and Meelick"?—Yes.

5034. Then again, the same from Meelick to Portlanna. And number 7 is "Excavation in the river above and below Killaloe weir, improving the bridge and other works, £35,000." That I think answers to as item in your estimate of about £25,000—so that it is rather more than you estimated would be necessary there?—I think you must be wrong there. Here you included everything in my estimate.

5035. Well, I hope I have—I meant to do it—I hope so, too. Engineers' estimates are very seldom too much; they are very often too little. I find on looking at the report that I have got this, "Meelick to Killaloe, excavation £20,500." Then, in addition to that, there are sluices.

5036. Yes, but perhaps you will take it from me that the sluices are already made?—Very well. "Embankment and wall alongside navigation channel." "Embankment"—Rabbit housing; "pitching on slopes." "Wall"—Rough sailing. "Temporary diversion of water, &c." These, I suppose, are not included. You say the sluices are already in?

5037. Yes?—Very well, then it seems that my estimate of excavation and removing portion of existing weir, and excavation of bed of river above and below the bridge, and the sluices, and for reserving a portion of the existing weir was £30,000.

5038. Any little difference of that sort might be accounted for by the rise in price, or something of that sort?—Yes.

5039. But, practically, that seems very nearly what you recommended, as far as expenditure goes, at Killaloe?—Yes.

5040. Does it occur to you that any lowering of the level of Lough Derg was a matter of great importance?—Certainly, because you do two things if you lower the level of Lough Derg—you make it a larger impounding area, which is of very great importance, because you prolong the time during which the sluices may be opened in order to discharge the water from Lough Derg below Killaloe, and you lengthen the time between the level of low water and the point at which the water would overflow the callows along Lough Derg, which I think are considerable, if I remember right.

5041. I think I am right in saying there is very

little fall between the head of Lough Derg and Meelick Lock 1—Very little.

5042. And there is a very large amount of flooded land between the head of Lough Derg and Meelick Lock 1—White's Ford comes between Lough Derg and the Victoria Lock at Meelick.

5043. Yes, it does; but still, even without considering White's Ford, the fall is very small 1—Not very much.

5044. Might we take it that Killaloe is very much the key of the position of the Lower Shannon 1—Yes, very much.

5045. Did you form any opinion as to the value of the navigation, or was that entirely outside your inquiry 1—Quite outside my instructions. My instructions were distinct, and they did not include any question as to the value of the navigation.

5046. You took the navigation as an accepted fact to be provided for 1—Yes. "That the works to be designed should embrace all that is necessary throughout each separate reach of the river, extending from the point called World's End to the lower end of Lough Allen; to secure the lands adjacent to it against the injurious effects of ordinary winter floods—which works it is considered will also fully provide against all extraordinary summer floods, such as that which occurred in 1861." Now, I think that is a fallacious notion altogether. We cannot tell when the biggest floods will occur. When I was making the Manchester Water Works, almost every year we had the largest flood in the first week of October—about the 6th, 7th, or 8th. That could not be considered a winter month; and the idea of relieving the land from summer floods in a way which shall not also relieve it from winter floods, which are said to be beneficial, has always appeared to me to be a fallacy.

5047. The Chairman.—From June to September we considered the worst months in the Shannon 1—Supposing a flood occurs in June, July, or August, when the hay is upon the ground—a flood may occur then.

5048. Yes, that is so—from June to September are the worst months.

5049. Mr. Barry.—You mean the most critical months, not the worst for rainfall, but the months in which the floods do the most damage 1—Yes, but how can you guarantee that a flood, bigger than the flood of 1861, and as big as the biggest winter flood, shall not occur in those months.

5050. That may be, but still I daresay you have seen this report of General Sankey's in which he gives the number of days per year in which floods have taken place during the months of June to September, first of all from 1830 to 1843, then from 1843 to 1850, and then from 1850 to 1855 1—Yes. He takes eight years before the works were commenced, then twenty-eight years after the works were executed, and three years since they made their alterations in Meelick; and then he goes on to say the three years are too short a period to take, and I agree with him in that. I am not quite sure that averages are of any value whatever, because it is not the average that serves as any criterion, but it is the biggest flood which does the mischief. Supposing you have a big flood of 44 inches, and another of 4 inches, the average is most fallacious—you will have an average of 24 inches.

5051. Yes, but these averages are the number of days 1—I do not think the number of days is of any consequence, because a single day does as much mischief as a hundred days when the hay is on the ground.

And that is the fallacy—it is the abominable principle which underlies that report—of taking the average. It is not the average, nor is it the number of days either, although, of course, the chances are less that you will have a severe flood out of 120 days than 220, still if you have a large flood in the 120 days you just do the same mischief. I grant you that you lessen the chances of a flood by anything you do to improve the drainage, but you do not secure it by any means. And almost the last paragraph of General Sankey's report refers distinctly to that, and I quite agree with his observations.

5052. You mean this last paragraph where he says he cannot undertake to relieve the land in all cases of flood 1—Yes; but he goes farther than that—he says, "Occupiers trusting possibly to immunity from flood for several years in succession may turn the meadows into tillage land." That is the danger that I see—that if you improve the land so much, they will say, "Oh! we need to have floods for 120 days; now we only have them for twelve; I do not see why we should not run the risk and till the land." Very well, they do so, and they lose their crop and then they complain of the Government that has done the works, and they say it is the fault of the Government. That was the song that was sung a great deal—that they were led to expect that the execution of the Shannon works would do them a great deal of good. It did do them a great deal of good, but inasmuch as it did not do them all the good that they expected the said it damaged the land.

5053. Would you put that view as high as this, that you would not recommend an expenditure of £100,000 unless the Government could see its way to also expend an additional £200,000 to carry out your report in its entirety 1—It would depend upon the object to be attained. If the object to be attained is to save the land as much as possible from floods, then I should say do not spend £100,000; unless you can spend twice or three times as much it would be throwing money away—it would not answer the purpose.

5054. Could you give any opinion as to whether the expenditure of £100,000 would relieve the floods for the four months from June to September 1—No; I will not say that; but I will admit that the expenditure of £100,000 judiciously laid out, and in the right direction, could not do otherwise than reduce the number of days during which the land was inundated.

5055. As the outcome of your report, did not the Government propose a bill in which they undertook to pay £150,000 if the landowners would pay another £150,000 1—I believe so.

5056. Therefore at that date the Government were prepared to spend £150,000 on the Shannon 1—Yes.

5057. Mr. Abernethy.—Following up the very important question that Mr. Barry put to you, may I ask do you not consider that the safest improvement to be effected is dealing with Killaloe as the key of the position, and the lowering of Lough Derg 1—I have no doubt the lowering of Lough Derg would benefit the land immediately surrounding Lough Derg. It would depend upon the manner in which the sluices or other means of discharging the water from Lough Derg were arranged at the lower end whether benefit or damage would accrue to the land between Lough Derg and the sea.

(Adjourned to Thursday, at eleven o'clock.)

Feb. 28, 1867.

J. B. B. B.  
Lancaster  
Barnes, & Co.

TWENTY-EIGHTH DAY, THURSDAY, FEBRUARY 24<sup>th</sup>, 1887.

THE COURT MET AT 32, ARUNDON-STREET, WESTMINSTER, S.W.

Present:—Sir James Allport (Chairman); James Abernethy, Esq.; J. W. Barry, Esq.;  
J. T. Pies, Esq.

The Earl of Erskine called in and examined.

5068. The Chairman.—We have had before us the Report of the Committee on the Drainage question, of which you were Chairman, and we understand that you are desirous of giving us some information as regards the drainage district of the Erse, and we shall be glad to receive it. Probably it will be more convenient to you to make the statement in your own words than to answer questions?—I believe you did get a memorial from the Secretary of the Erse Drainage Board on the subject. They have got to the end of their money, and they are very anxious to get some fresh money from the Treasury. In fact if they do not get it they will be obliged to suspend the works. They thought that if you saw your way to making a recommendation to the Treasury it would carry very great weight with them.

5069. I do not know how far such a question as that is referred to us, but we will look into that?—Then I will tell you how they stand at present. I think you are aware of the circumstances of the works, and you have visited them. The estimate for the works was, I think, £104,000. It was something under that originally, and then Mr. Hawkesley, who was the engineer sent down by the Board of Works under the Act of Parliament to examine and report, raised it by something like £10,000, and I think the estimate as finally revised stood at £104,000. On that the assent of the requisite number of proprietors was obtained. Now difficulties have arisen. In the first place, owing to the disturbed state of the country in the year 1853, when they began the works, they were not able to get a contractor, and they had to do a good deal themselves. They have now had a very expensive lawsuit, which will cost something like £10,000 altogether, about an eel weir. They were advised by the best counsel, Mr. Moore, who was then, I think, the Solicitor-General to the Conservative Government, and afterwards by The McDermott, also Solicitor-General under the late Government. They were advised to go on with it, and in fact they were told they would be neglecting their duty as a Board if they did not. That will cost them in one way and another something like £10,000, and the result has been they have already spent more than the money that the works were estimated to cost, and they will not be able to finish the works unless they can get, in round numbers, £24,000 more.

5070. Do I understand that that fishery right too cost them £10,000?—They estimate that it will, altogether.

5071. It is not yet concluded?—No.

5072. In what stage is that action?—It has been given against them, and they have been advised by their counsel not to appeal.

5073. Then you may consider it is practically settled?—Yes.

5074. Mr. Barry.—Has it been settled that the Commissioners are obliged to buy the eel weir, and then cannot work it themselves afterwards—that it was *ultra vires* for them to work the eel weir themselves?—The effect of the decision has been that they have no right to the eel weir at all.

5075. Although they bought it?—Yes, and that they had no power to purchase it.

5076. Have they paid this money in the nature of compensation?—Yes.

5068. And they do not get any rights to use the eel weir in return?—Quite so.

5069. Then the money is absolutely gone?—Yes.

5070. Mr. Pies.—Do you know what they had to pay in compensation for that weir?—No, I could not tell you that.

5071. The £10,000 is the cost of the lawsuit?—No, it includes everything.

5072. Chairman.—The £10,000 includes the compensation and the costs of the action?—Yes, and that has caused them to exceed the estimate to that extent.

5073. Can you tell us what amount they have spent actually upon the Drainage Works?—They have spent the full amount of the estimate, I think—£104,000, and some £34,000 besides.

5074. To what extent would the Works require a further loan?—I have got the particulars here from the Secretary. They have now cash in hand £16,500, and they estimate the value of the plant at £5,000—that is a total of £21,500. Then the outgoings are as follows:—First of all, there is the balance of South contract—£6,000; the interest on the loan due to the Board of Works, £12,500; law costs (say), £1,000—that has nothing to say to the eel weir; cost of dredging for three years more at £220 a month, £8,000; dry work at (say) £1,000 a month, £4,000; and sundries, £1,000; total, £42,500. Then, deducting credits, £21,500, that leaves required to complete the work £21,000.

5075. That includes £12,000 interest due to the Board of Works?—Yes.

5076. Then the works themselves would only require about £10,000?—About £10,000. Then what they ask of the Board of Works is that they would cancel the charge for the interest, and give a grant of £10,000, and then the secretary estimates they would just pull through without having to get an additional loan. I may say that I went to the Treasury about it, but the Treasury not having heard from the Board of Works, could give me no answer. The Secretary to the Treasury grumbled very much at the way the estimate has been exceeded, and I explained as well as I could the reason why that had happened. I do not think it was the fault of the Board at all.

5077. According to your statement now, the estimate have been exceeded more by this fishery right than anything else?—Partly by that.

5078. It appears you only want absolutely in cash £10,000 to complete the works?—Yes.

5079. This fishery right and compensation have cost you £10,000?—Yes.

5080. Was there any sum put down in the original estimate for that fishery right, because if not, the estimate has not been exceeded?—I could not tell you that.

5081. Do you know whether the interest was included in the estimate?—Yes, that was so.

5082. Then it is an excess of £12,000?—Yes.

5083. Mr. Pies.—You have been a long time carrying out the works, and that has made the interest charge greater than originally estimated, I presume?—Yes; I do not know whether you are aware that there was an Act of Parliament passed some ten years ago, by which a free grant of £15,000 was given on



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account of the navigation part of the works, and provision was made for another £15,000 being levied off the baronies adjacent. From some flaw or hitch in the Act of Parliament, the works were thrown back a year. The Board of Works would not advance the money till the doubts had been cleared up, and that increased the expense.

5084. The Chairman.—Then practically your view is that you think the Board of Works of Ireland ought to forgo the £15,000 interest, and that a further grant from the Treasury should be made of £10,000 towards the whole of the works to be completed?—Yes.

5085. That is your view?—Yes, that is what I think.

5086. Mr. Barry.—I would ask you whether your suggestion is that the demand of the Board of Works should be absolutely given up, or should be postponed?—The demand for interest should be given up; no money is repayable till the work has been completed.

5087. Assuming that this is an expenditure upon productive work which comes into its productive capacity afterwards, would not it be a right thing if the Treasury forgoes its interest pending the completion of the works, to say that after the works are completed that should be a charge on the works?—I think it should be abandoned altogether. What the Board asks is, that as from unforeseen circumstances over which they have had no control, they have so exceeded their estimate, they think the Board of Works should give up their claim to that amount of interest.

5088. The Chairman.—Has the work been executed at all under the inspection or supervision of the Board of Works?—The Board of Works sent down their inspector from time to time to see that the money had been properly expended.

5089. Were his reports in approval of the works so far as they were carried out?—I believe so. I am not a member of the Board myself.

5090. Has there been any objection raised either by the Inspector or by the Board of Works to what has been done?—No, I think not; not so far as I am aware of.

5091. That leads one to infer that they have given their approval?—Yes.

5092. Do you know the state of the works now?—All the heavy work has been completed. Of course, the great expense was the sluices and cutting at Belleek. They had to cut through many feet of solid rock to make a channel for the water to go out, and they had to build a new bridge at Enniskillen, and had very considerable dredging works to execute above and below the Enniskillen Bridge. Those are the two heaviest sections. The work to be done now is cutting and straightening the channel between the lakes. There are twelve miles of narrow river between the upper and lower lakes, and there is a good deal of cutting and dredging to be done there.

5093. We saw some of the works that had been carried away by the floods?—There have been several cuttings in that place.

5094. Mr. Barry.—For what term of years is the interest payable by your Drainage Board?—I think it is now thirty-five years. It was twenty-two, and the Committee, of which I was Chairman, recommended that the term should be extended to thirty-five, and I believe that was carried out by a subsequent Act of Parliament.

5095. The Chairman.—And that thirty-five years commences from the time the works are completed?—Yes. There is no charge till the works are completed. The Board of Works then send down a surveyor, and apportion the charge on the lands benefited according to the benefit received, but they do not do that till the drainage is completed, and they are able to see what benefit the land has received from it.

5096. Mr. Barry.—Certain lands, I suppose, have already gained some advantage from the drainage?—I do not think very much. The flood still comes over the land. It runs off quicker, but the damage is done. A flood coming and staying for a fortnight or three weeks on the land spoils it very much.

5097. What rate per cent, does that amount to

when it is taken at thirty-five years with a sinking fund?—Five per cent; it was six and a-half.

5098. The Chairman.—We were informed on the spot that the contractor was not likely, unless he could get better terms, to reconstruct the dam that was carried away by the flood just below Enniskillen?—There was a dam carried away at Portora stream, and I think there was another above Enniskillen as well, so far as I can remember, but the contractor could hardly begin to reconstruct it now till the dry weather comes.

5099. We were told the contractor was not likely to undertake it again at all?—I thought the greater part of the dredging was finished there.

5100. Mr. Barry.—With regard to the completion of the works, is it a matter of estimate, or has any contract been entered into?—It has been done, partly by contract, and partly by the Board themselves. I think, as far as the figures have been given me, there is still £16,000 due to Mr. Best, who is the contractor, before it is finished, and I think the remainder the Board do themselves—the dredging and dry work.

5101. The remaining £6,000?—It is more than that—£12,000. £8,000 for the dredging and £4,000 for the dry work.

5102. Could you tell us at all how much of this additional expense is due to navigation, and how much to drainage?—The navigation was estimated at £30,000, and it was on that account that the free grant of £15,000 was given, and the provision made for raising the other £15,000 off the baronies.

5103. I meant rather how much of what is contemplated to be spent is due to navigation, and how much to drainage?—I should imagine it is all due to drainage.

5104. It was pointed out to us on going up the Upper Lough Erne that some of the cuts remaining to be finished were for navigation purposes?—I should think the £30,000 for navigation that was granted would cover anything properly chargeable to that.

5105. The Chairman.—Do you attach much importance to the navigation as compared with the drainage?—No, but we are obliged to keep it up.

5106. Is there much traffic?—There is a certain amount of local traffic. It is not very large, but the Board of Works insist naturally that the drainage works should not interfere with the navigation.

5107. What quantity of arable land do you expect to be benefited by these works?—I think it is about 18,000 acres.

5108. Is the whole of that arable?—It is all arable, with the exception of some parts of what they call "chuddagh" on the shore.

5109. Mr. Pim.—Has the £15,000 been charged on the baronies yet?—Yes; that was done before the works began.

5110. Mr. Barry.—Do you consider that the navigation conflicts at all with the drainage in the Lough Erne District?—No; I do not think it does. There are no locks or anything that will keep the water back.

5111. But assuming the lower Lough Erne were lowered—that the level was considerably lowered—would not that enable the Upper Lough Erne to be drained much deeper, and the two Loughs would be reservoirs for floods?—No doubt that would give a greater fall from the Upper Lake.

5112. But the level of the Lower Lough Erne I suppose is kept up for navigation purposes?—The Lower Lough Erne is a very deep and broad sheet of water; but the people living round the shores would object to its being lowered very much.

5113. Because of the appearance?—It would necessitate the reconstruction of all the piers and quays round the Lake. I do not think the Board have power to lower it very much.

5114. With regard to the navigation, to which this £30,000 was made applicable, was there in contemplation a through system of communication between the

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eastern part of Ireland, and the Upper Lough Erne?—Yes; the idea was that there should be through navigation from Belfast to Limerick by the Lagan Canal, Lough Neagh, the Ulster Canal, and the Ballinacorney Canal from Lough Erne to the Shannon.

5115. Do you attach any importance to the navigation?—A part of it I think, from Belfast to Lough Erne, is useful.

5116. You think there would be navigation from Belfast to Lough Erne?—I think there would be; I do not attach much importance to the rest of it, from Ballinacorney to the Shannon. In fact it would require an immense amount to put the Ballinacorney Canal in working order.

5117. You think the east and west traffic would be worthy of consideration from Belfast to Lough Erne?—Yes; I think there would be considerable traffic there.

5118. The Chairman.—Is there much traffic by water?—Not much now; the Ulster Canal has fallen into such a bad state that there is only draught of water for very small barges to go along it. There is a little local traffic, but no through traffic.

5119. Have you had any experience of the navigation generally since railways have come into competition. Have the navigations fallen into decay or damage to a considerable extent?—They have a good deal; but I think if the Ulster Canal were put in order it might be made available for a good deal of heavy traffic. Take for instance the Royal Canal that runs alongside the Midland Railway across half Ireland. There is a very considerable amount of traffic on that. That is what I have heard, but I do not speak from personal experience.

5120. Mr. Barry.—I notice that there is a through line of railway communication from Belfast to the upper end of Lough Erne and to Enniskillen?—Yes; it runs from Belfast by Portadown, Arragh, Clones, and then along to Enniskillen.

5121. Have the baronies subscribed the £15,000 to the funds of the Board?—Yes; before the work was begun there was a meeting called and the baronies all sent their representatives and decided to contribute. They were obliged to do that under the Act.

5122. So that the Drainage Board of the Lough Erne District is to that extent pledged to carry out the works of navigation whether they are useful or not?—Yes.

5123. I am afraid you cannot tell us how much of the future expenditures, which is now contemplated, is work necessitated by navigation purposes, and how much for drainage?—No, I could not tell that at all. I should think it would be very hard to separate the two. The navigation and drainage works are so interwoven that I think it would be very difficult to estimate how much ought to be properly chargeable to navigation.

5124. The Chairman.—I observe there is a very good system of railway between Belfast and Ballinacorney?—Yes, there is through railway communication all the way.

5125. Mr. Barry.—Supposing the Board of Works were to lend a further sum of money, such as you suggest, that sum of money could be charged on the lands, I suppose, the same way as the former amount was?—Yes, that would be charged in the same way.

5126. Is it necessary to get any number of consents to the additional charge, or have the Drainage Board plenary power to deal with it?—I think they have power. I think if the Board of Works are satisfied of the security they can lend it.

5127. That would be an additional charge of £500 a year?—That would be an additional charge on the lands benefited. That would be a very serious matter for the owners of the lands; but still, sooner than the whole thing should stop, they would be willing to submit to that.

5128. How does the recent land legislation affect owners of property in respect of these charges upon their lands?—Of course it affects them very seriously, because it entirely depends on the view that the Land

Commission may take of the benefit. It might so happen that the owners would have to pay the entire charge.

5129. In the case where a judicial rent has been fixed, do you anticipate that the owners of property will get an addition to the judicial rent in respect of improvements which have been made since the judicial rent has been fixed?—What I imagine would happen would be this—when the work is finished, and the Board of Works sends down their inspector to apportion the amount of improvements, that sum would be over and above the judicial rent; but then at the expiration of the term of the judicial rent the Land Commission might take this view of it. They might say—this land is not benefited by the drainage, and they might reduce the rent by the amount of the charge. That is quite possible.

5130. In the first instance, the Board of Works would claim the interest from the land owner?—From the landlord. The landlord is responsible for the repayment.

5131. Then under the Act of 1863, the landlord has the right to call upon the occupier to find that money, has he not?—Yes; not the whole charge, but only the amount by which the land is supposed to be benefited. If the charge is more than the actual benefit to the land, the landlord is responsible for the excess.

5132. Then the tenant has the right to challenge the assessment of the Board of Works?—Yes, I suppose he would.

5133. The Chairman.—Has not that been changed since the Land Acts of 1870 and 1881. The Drainage Act of 1863 provides that the land owner only should be assessed; but surely the Land Act of 1870 and the subsequent Act of 1881 have altered that?—There has been no legislation since the Land Act of 1863.

5134.—Not since 1881; but has not that so completely altered the relations between landlord and tenant as regards the rent that the provisions of the Act of 1863 are practically in abeyance?—After the Act of 1871 an Act was passed giving the Board of Works power to assess the improvement. Formerly it was left to the landlord to do so. The landlord was arbiter of how much increased rent the tenant was to pay. Subsequently to 1871 an Act was brought in throwing the duty of apportioning the increased rent on the Board of Works; but there has been no legislation since 1881. In fact if this scheme had been put forward since 1881, the position of the landlord has been so entirely changed that there would not have been the smallest chance of getting the requisite number of assents.

5135. You cannot get the landlords now to assent to these drainage schemes?—No; it would be out of the question.

5136. Does the incidence of taxation apply exclusively to the land proposed to be benefited or does it apply to the district generally?—It applies to the land proposed to be benefited exclusively.

5137. Have you any opinion upon that whether the assessments should apply to the lands probably not immediately benefited by the drainage, but remotely benefited by the climatic influence or sanitary influence, and whether a certain zone of land outside the flooded land should be assessed so as to contribute towards these drainage works?—Yes. I am very anxious to mention that point. As a matter of fact the owners of flooded land are obliged to self-defence to undertake these drainage works. I remember many years ago when I was a boy these floods never did the damage that they do now. The lake used to rise by degrees and one flood had time to run off before another flood came. Now, consequent on the opening out of drains in remote parts of the district the whole body of water comes down into the lake at once, and completely swamps us. The outlets are the same as they always were, and the flood water does not run off and cannot run off naturally. It is all dammed back. These very extensive drainage works were forced upon us by the works that

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have been carried on during the last thirty or forty years in remote parts of the drainage district.

5138. Mr. Barry.—By what might be called upland proprietors?—Yes, and they get off scot free. They have assumed us and are not obliged to pay a penny to relieve us. I am not so much alluding to general drainage works so to every stream that comes into the lake from the catchment. From time to time drains have been opened into them and they have been straightened by local proprietors and the water has been conveyed down quicker so to the proprietors bordering the lake and at the same time nothing has been done to enlarge the outlet.

5139. I suppose you allude to what in England is called sub-soil drainage and what in Ireland is called through drainage?—Yes.

5140. The Chairman.—My question was more as to the incidence of taxation and whether the assessment should apply exclusively to the land benefited or be extended to land above and below the flood level which may be benefited remotely by climatic improvement or sanitary improvement; because you can hardly extend that taxation to the upper reaches where the improved drainage has brought down the water so much more rapidly?—I quite see the difficulty of doing so, but at the same time I think it would be only fair that as far as possible the whole of the catchment basin should be made to contribute. Of course the higher the better. As you say I know there will be very great difficulty in making the remote parts contribute.

5141. One witness proposed three zones; the lower one to apply to the land immediately benefited; a second zone going a certain height above the flood level with a less tax than in the lower one, and then an upper one which may be supposed to be benefited by the improvement of the temperature or in a sanitary manner which should be only to a small extent taxed?—That would seem to me to be a very fair way of meeting the difficulty. Of course, the lands that are flooded and are most benefited should naturally pay the larger share of the cost—that would be only fair—but I think if a way could be devised to make the remaining part of the catchment basin pay something it would be fair also.

5142. Mr. Barry.—Do you think the town of Enniskillen reaps benefit from the diminution of flood?—I think it would; in high flood the lower streets of the town and the houses are sometimes flooded.

5143. I rather mean, apart from the town being absolutely flooded itself, would the town reap benefits of a more indirect nature from the improvement of the whole neighbourhood?—Yes; the town would reap benefit from the development of navigation to begin with.

5144. I suppose anything that affects the prosperity of the district affects the prosperity of the town?—Yes, no doubt.

5145. And at present the towns contribute nothing?—The towns contribute nothing because there is no improved land in them.

5146. The Chairman.—The tax has been hitherto confined to the lands benefited?—Exclusively.

5147. Mr. Fin.—Does the town of Enniskillen contribute to the baronial charge for navigation?—I suppose it does, but it would be to a very small extent; the baronial contribution is £15,000, and that is levied off a considerable number of baronies—I forget now how many—but there are eight in Fermanagh, and three or four between Cavan, Monaghan, and Donegal.

5148. Mr. Barry.—I think that in the report with which you are acquainted, made in 1878, attention was drawn to the fact that towns were not charged although they did reap some benefit?—Yes, I think it was, but I have not seen that report very lately; in this case they would say they had no voice in the adoption of the plans and that it would not be fair to charge them.

5149. Still you do think that towns situated like Enniskillen—and there are other similar examples in Ireland—do reap an advantage?—I think there is no doubt they do; certainly in sanitary matters they reap considerable advantage.

5150. The Chairman.—That advantage would not be sufficient to induce them to give their consent to the drainage of land if they had to be taxed for the work?—That is the great difficulty, the obtaining the assent.

5151. That opens up a wider question, whether the decision should be left to the owners in the immediate neighbourhood, or whether it should be left to the Board of Works, or some special board appointed for the purpose of superintending and carrying on these drainage works and deciding whether it was necessary to do drainage or not?—Well, I have thought of that matter a good deal, and I think unless you leave it to a board of that kind you will have no works carried out in Ireland now. It is very clear the owners will not assent, and the difficulty of getting the assent of the acceptors would be so great that I do not think any extensive work of the kind would ever be carried out in Ireland.

5152. Then looking at the importance of the whole of the work, extending over the whole of Ireland, would you recommend that the present Board of Works have charge of the drainage, or would you have an independent board affiliated if you please to the Board of Works, but still to a certain extent independent of it?—I think, looking to the very great importance of the question, which I think it is impossible to over-estimate, I should be disposed to have an independent board, perhaps affiliated as you say to the Board of Works, in charge of the whole arterial drainage system of Ireland.

5153. Mr. Barry.—Then I presume you would say that the present system is not applicable to the altered state of circumstances?—The present system may be looked upon as dead. Since the passing of the Land Act of 1881 the position of the owners of land has so altered that I do not think you would ever get assent to carry out drainage works of any sort.

5154. In the present infliction of schemes the fact that somebody has to run the risk of the preliminary expenses gives rise to a good many difficulties, does it not?—Yes, it does, and unless you get some public spirited individual who will put forward a scheme and take the chance of the scheme not being adopted, of course there is no chance of getting anything carried through.

5155. Do you think those circumstances lead rather to want of due consideration beforehand of the problems which have to be solved in questions of drainage?—I do not think the advantages of drainage are sufficiently appreciated in Ireland.

5156. I am pointing rather to the consideration of the engineering necessities. Do you think the engineering necessities of the drainage are sufficiently considered in the outset in many of these drainage proposals. The fact that somebody runs a pecuniary risk in the outset, and that there is a tendency to keep the preliminary cost down seems to be a condition of affairs that leads to schemes being proposed without a sufficient amount of consideration being given to all the problems involved?—I think that is so. I think anybody bringing forward a scheme with a view to its adoption tries to make it as cheap as possible, and the engineer has a great temptation to under-estimate the cost of the work.

5157. And further than that, do you think he would have a tendency to save money in the preliminary studies?—I should think that that was very likely. The great object is to keep everything down as much as possible to save expense so as to get the work carried out at the least possible cost to those who will be taxed.

5158. And if the engineer has to find the cost of the preliminary studies out of his own pocket he would not, perhaps, give so much preliminary investigation

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to the thing as he would if he had more funds at his disposal for preliminary expenses?—There is no doubt of that, I think. With regard to the Lough Erne Drainage, I think there were no less than four different schemes brought forward before one was finally adopted. There was a scheme in the year 1848 by Mr. Forsyth.

5159. Was he an engineer?—He was an engineer. I think he was connected with the Board of Works of that day. It was before my time, so I only know of it from hearsay. Then Mr. Lyman brought forward a scheme, and afterwards Mr. Barton. These three were all put forward, and failed to obtain the necessary assents till this scheme of Mr. Price's, which is now adopted.

5160. In those instances did those gentlemen find the money out of their own pocket?—No.

5161. Did the landowners find it?—Yes. I cannot say about Mr. Forsyth's scheme, but as to Mr. Lyman's scheme, the money for that was found by Mr. Porter. For Mr. Barton's scheme the money was found by a committee of landowners—all the principal landowners, my father, Lord Enniskillen, and several others, in the neighbourhood. For Mr. Price's scheme Mr. Porter again found the money.

5162. The *Chairman*.—Each of those schemes related to the same particular district?—The same district—the Lough Erne district.

5163. Not various sections of the district?—No. It was the whole district.

5164. There were several different schemes for the same district?—Yes.

5165. Mr. *Pine*.—Why did Mr. Barton's scheme not obtain acceptance—was it that the estimate was too high?—Too high. I think it was £170,000. Mr. Barton's scheme was a larger one than Mr. Price's. It went up the tributary rivers, and I think the estimated quantity of land benefited was over 32,000 acres.

5166. Is not there a great tendency when you have to get these assents, to frame the scheme in such a way as to obtain the assents rather than frame it in the best manner from an engineering point of view to effect its purpose?—That is the tendency, but then you have the supposed safeguard of the Board of Works' Inspector. Before the scheme is finally adopted the Board of Works send their Inspector down to report upon it.

5167. The *Chairman*.—I suppose under the present Land Act of 1881, the relations between landlord and tenant are so completely altered that it would be necessary to put the taxation on the tenant instead of the landlord, assuming that there is an alteration made in the judicial rent?—No doubt.

5168. Then these district boards would consist chiefly of tenants, instead of landowners?—Yes, chiefly tenants. Of course, the tenant being the responsible person he would have the election of the Board. Then the great difficulty of that would be to get the assent of the requisite number of tenants.

5169. That brings us back to the question I put before, whether it would not be advisable for the initiation and the decision of these matters to be left to some independent board to say what ought to be done?—Quite so. I am quite sure that is the only way in which you would ever get drainage works carried out.

5170. That would be doing it without the consent of either landlord or tenant?—We had the greatest difficulty in this Lough Erne Drainage Scheme to get the sufficient number of assents of the proprietors. I think it was one of the recommendations of our Committee of 1879 that the proportion of required assents

should be changed, and had it not been for that change we should never have got them. Under the Act of 1863 the assent of two-thirds in value of the proprietors was requisite. We recommended that the assents of one-half should be sufficient in the absence of the dissent of one-third. That recommendation was carried out by a Bill which became an Act of Parliament, introduced by The O'Connell Don a year or two after our report, and if it had not been for that we should not have got a sufficient number of assents for the formation of the Lough Erne District.

5171. The suggestion I ventured to make to you is that of a Board whose jurisdiction should extend to the whole of Ireland, and which would rather supercede any assent from any one?—Quite so. I quite assent to that. I think it is essential.

5172. From your long experience in the House of Lords and the House of Commons, do you think the Legislature would pass a Bill of that kind?—I think there would be a very great difficulty to get a Bill of that kind through.

5173. Mr. *Pine*.—Would not that amount to a compulsory system of drainage?—It would. It would be paternal government. But I do not see how any works in Ireland are to be carried out unless something of the kind is done. At the same time I see the difficulty there would be in getting the House of Commons to adopt the suggestion.

5174. Mr. *Barry*.—You think there is very little chance of the assents as a body carrying out drainage schemes?—I think there would be very little chance. In Ireland you have to deal with such an enormous number of small concerns. There are so many small tenants, and their only idea would be the increase of taxation that would be put upon them. The difficulty of getting the requisite number of assents for any large undertaking would be almost insurmountable.

5175. On the other hand if the Government or any public Board were to charge compulsorily a rate upon land, would not there be a considerable difficulty in getting such a tax collected?—Well, I am afraid there would be considerable difficulty in getting any tax collected just now.

5176. The *Chairman*.—Then it practically comes to this—either to submit to the present very imperfect system of effecting drainage in Ireland, or to have a compulsory system?—I think so.

5177. And there is no alternative but those two?—I do not see any.

5178. Mr. *Pine*.—In the Lough Erne case did not some of the landlords get the written consent of their tenants, or a letter from their tenants, saying that they would be willing to pay the charge if the landlords undertook to join in the scheme?—I am not sure whether any landlords did that. I know my father called a meeting of those tenants who were interested in the matter, and explained the whole thing to them, and then put it to them whether they wished it adopted or not, and they almost unanimously voted for it. I am not sure whether any landlords obtained written assents.

5179. The *Chairman*.—How many years is that since?—That was in 1866.

5180. That was just before the last Land Act?—Yes, the year before. In the Lough Erne district I am much the largest proprietor of flooded land, and the whole thing hinged then upon my father's assent. If he had refused to assent, the whole scheme would have dropped. They could not have got the requisite number without him.

[The witness withdrew.]

*Edward McElallen Murray, Esq., M.P., called in and examined.*

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*Edward McElallen Murray, Esq., M.P.*

5181. The Chairman.—I believe you are member of Parliament for North Kilkenny?—Yes.

5182. As I understand, the information you wish to give is appertaining exclusively to drainage districts in County Kilkenny?—Yes, two districts, which are all in Kilkenny. I am not an engineer, but I think they would conveniently illustrate my views generally with regard to drainage as applicable to Ireland. The first district which I will give you as an illustration, is a district called Uringford and Johnstown. It runs from Uringford and Johnstown down to Darrow. It is the Erkins River and it is the boundary between the County Kilkenny and Queen's County. It is a small stream that runs down to Darrow about twenty-four miles.

5183. And there joins the River Nore?—Yes, it takes its rise in the Silver Fardagh, and it traverses about twenty-four miles. That is the subject matter of an arterial drainage that we have been trying to carry out for the last four or five years. It is about twenty-four miles long, and it is of intermittent breadth. In some places it is three or four miles broad, and in other places it runs in to 300 or 400 yards. It is a very sluggish stream, and about midway it takes in another tributary of the same character running from the Queen's County. The main obstacle to the drainage is just a mile above Darrow. There there is a bottom of hard sandstone or greenstone, which should be blasted away or removed, which causes this water-logged valley. It is a perfectly water-logged valley for about these twenty-four miles.

5184. Have you had it surveyed by an engineer?—It has been already examined and reported upon by the Board of Works, but it is in abeyance, for the reasons I have to tell you. The Board of Works have sent down an engineer, Mr. Barrington, and he has reported on it, and all the maps, specifications, and plans have been prepared and the usual preliminary requests have been complied with.

5185. But nothing further?—Nothing further in that way. I should wish to mention that not only would that relieve and drain the land as far as the improvement of the land goes, but it would effect the sanitation of towns that are absolutely, as to one of them, in the midst of it, and others abutting on to it.

5186. Going step by step, what quantity of land would be reclaimed from flooding if the drainage works which have been proposed had been carried out?—The exact quantity is regulated by the breadth of the twenty-four miles. In some instances it is two or three miles wide that would be arterially drained. In other places it runs narrower and very little would be drained. The maps, and plans, and specifications would tell you exactly what it is, but I have not got those with me.

5187. My question rather referred to the quantity of land—how many acres?—I should not be competent to tell you how many acres altogether there would be in the twenty-four miles. It is a very large quantity; but that could all be furnished.

5188. Could you give me an approximate estimate of the quantity?—I should say 1,700 acres unwatered and as much more improved. I did not expect I should be asked upon this matter or I would have put the plans and specifications before you. I am merely using this as an illustration of the general matter, such for instance as the sanitation question. There is a town at the commencement of this drainage called Uringford. It has not got town commissioners nor a corporation, but it is a small town. Then next to that is a town called Johnstown, two miles from it, on the same drainage, surrounded in fact by this water, and further down there is Darrow, another town. All those towns are affected now by the want of drainage in their sanitation, and it would be fair that the general inhabitants, in my opinion, should pay something towards the drainage, so far as they would be benefited in a sanitary point of view.

5189. Then you would extend the incidence of taxation to the whole catchment area?—I certainly should. I should be inclined to put it on the valuation of the district—to make a rate for it on the valuation of the district.

5190. Would you make it a uniform taxation or tax the lands improved higher than those immediately above the flooded portion, and tax the higher lands less still?—I should be inclined to have it apportioned on the same principle that the Drainage Rate is apportioned, in proportion to the improvement of the land. I would apply a certain portion of it on the parts benefited by the sanitation.

5191. For climatic improvement in fact, or sanitation?—Sanitation would be a very great improvement to the health of the inhabitants, and if you were to see the way they are situated in the centre of this flooded valley you would say so. But I must say this—that a great number of persons there are owners of land and would be hit twice over.

5192. Have you turned your attention to what might the fog and damp and injury to the climate and health of the inhabitants extend. Is it 50 feet or 100 feet above the level of the flooded land?—I could not exactly say that, because I am not a professional man, though I have observed that. I would only say this—that there is a duck shooting there, which I have frequently been on. In fact, I may mention here, that the great opposition to this Drainage Scheme is by the owners of this duck shooting, on the ground that it would interfere with very valuable snipe and duck shooting, which extends in the centre of this large drainage. There are large barrels and take snipe in the bag, in different directions, in which a man, perfectly dry, can stand and shoot. It is a very delightful thing of course, and if I, myself, were the owner I should not like it to be interfered with at all. But, however, that is the main cause of our not having got a sufficient number of assents here. The time for the assents is out; but we have failed in getting 50 per cent. of assents, merely by reason that it was a duck and snipe shooting.

5193. Would you then alter the present mode of getting assents, or instituting a Scheme of Drainage. Would you suggest that it be taken out of the hands of the Local Boards and put in the hands of some public body, either the Board of Works or some independent Board of Drainage, which should have the power of instituting a Drainage Scheme in any part of Ireland they thought proper?—I think it would be highly desirable to have that; but if you had not that I should not be afraid if owners were constituted of the class which I am about to advert to. In the Act of 1861, the occupying tenants have been made what are called statutory tenants. They have got a certain fifteen years' term renewable for ever, if they pay their rent. Those men are virtually in the position of copyholders in this country. In one of the original Bills, I think it was in 1863, which Mr. Courtney had the custody of, it was proposed to include those men within the definition of owners of a district, that is to say, it said "copyholders," but it meant the statutory tenants. Now since that we have endeavored to have those statutory tenants included in the definition of owners of districts, for the purposes of the Act, and this time twelve months the then Secretary of the Treasury, Mr. H. H. Fowler, stated in reply to a question of mine in the House, that they would agree to that proposition, and they have agreed, or the Government of that day agreed to include those statutory tenants—these new class of tenants—in the definition of owners of districts.

5194. Assuming that the present tenants become the owners, as you suggest, do you think they would have sufficient inducement—self-interest will guide most men, of course—to give an assent to a scheme which would tax themselves?—I doubt it very much. In the case I am now mentioning they did so so. In that case the tenants met together and subscribed

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£100. They employed the County Surveyor, and he examined the district and found all the maps and specifications. Then the Board of Works were very kind to them and did not charge these full amounts, and made some of the plans and specifications. There, as I say, the tenants subscribed £100 to assist it; but I think that is an exception, because I know of many other places where the tenants want organization, and such is the depression of agriculture now, and such is the feeling, owing to causes I need not enter into, that they would not be induced to lay out money. In fact the tendency is against laying out money, the times are so bad; and, again, the local taxation is so very heavy. So that in that way, unless drainage schemes are initiated from some central body who will look after them in a paternal way, as a Minister of Agriculture would, and for general purposes would initiate them and see where they are necessary they will not be carried out. If they are left to Local Boards there is very little hope of anything being done.

5195. Then that would mean a compulsory Act of Parliament?—Decidedly. One great difficulty I find is this. Arterial drainage is the thing I go upon, because, as to thorough drainage in the present state of depression, it is a bad job; but in many places I know (and I can give you a strong instance presently) an arterial duct is wanted to cutwater a certain waterlogged valley, and the difficulty of driving it through particular properties, perhaps for a long distance, unless you include them in a drainage scheme is very great. They are afraid of being brought into the taxation. Possibly you do not do them any harm, but the contrary; and if you had compulsory power, by which you could come and open a duct, making compensation to those men and doing it compulsorily for them, I think it would be certainly a great advantage.

5196. Would you put that power into the hands of the present Board of Works, or would you have an independent Board to take charge of the entire drainage schemes of Ireland?—I certainly would, and one of the principal reasons I have in this. Unfortunately, instead of the Irish Office having the carriage of the proceedings with regard to drainage, you are aware they are under the Treasury, and that is an extremely inconvenient thing for us, because if we want to move in a local matter like that, we come here to England where it is mixed up with other business, and, obviously, local parties at such a distance cannot communicate as readily as if they were in Dublin. If the Chief Secretary's Office in Dublin, or some Board in Dublin had the entire management, and it were not left to the Treasury, it would be most beneficial. I do not think there can be a great difference of opinion between tenants and landowners as to the principle, and I am going to illustrate what I said about the arterial duct by this. There is another drainage district on the Nore, and I am a principal proprietor in the matter. The Nore flows down with a sluggish stream through that part of County Kilkenny, and on both sides of it there is a great deal of nice arable and alluvial soil. It meets a small stream called the Dymon, which runs into it at right angles at a place called Three Castles. That little river strikes at an acute angle the big river Nore and dams up that river. It is a mountain stream from the watershed of the Castlecomer District, and suddenly in from twelve to twenty hours it will flood up to a tremendous flood, where, at other times, you could walk across it. Then, when it floods it dams up the River Nore, and the result is that in the autumnal rains it floods six or seven miles upwards. The Nore rises and submerges all the corn in the valley for six or seven miles up. The whole of that could be obviated by cutting a little neck and sending the Dymon River in the other direction into the Nore—at least so I am advised by engineers; but the difficulty that arises there is this—the consequential damage to the riparian proprietors lower down than the cutting. That is one of the great deterrents that I and other proprietors have in attempting drainage in Ireland,

because engineers will come forward and find consequential damage, even if it is, perhaps, of a very remote character, and they have, in the North of Ireland, recovered very heavy damages. I recollect a case where £1,500 or £1,800 damages were recovered, and with costs, £3,000, against the promoters of a drainage scheme for what was considered by the promoters a very ideal matter, and not a substantial damage. I think that these consequential damages ought to be controlled in some way by notice, or in a similar way to the Land Clauses Consolidation Act, so as to bring the local riparian proprietors within the control of the promoters of a drainage district. I, myself, as an owner in this locality that I have mentioned, and am very much interested in it; but I certainly will not render myself liable to any indefinite damage of that kind, though I am quite satisfied to render myself liable for the rates.

5197. Mr. Barry.—Is there any Board of Commissioners who have charge of the River Nore?—There are Fishery Conservators, but they have no authority beyond the Fishery. It is a very good river for fishing, though poached upon in the close season.

5198. Is there no body of Commissioners or Trustees or any other body who have charge of the river as regards drainage?—No persons have charge of it, and for this reason, that above Banishogue it is private water—up from the millrace.

5199. How far does the tide run up?—A little above Banishogue—Woodstock, just below Kilkenny.

5200. Is it above Stonyford?—It is below Bennett's Bridge. All that is private water owned by the riparian proprietors; but it is under no public body, and there is no control over it. The control of the Conservators only extends to the Fishery, and it is of a very loose kind. There is an old Statute (28 Henry VIII., c. 22) relating to its navigation.

5201. If your Drainage District of the Ekin River were carried out would it have the effect of relieving the land from flood continuously?—That would permanently, no doubt, affect the drainage and interfere with the sheeting. It would relieve a waterlogged valley there, really, for about twenty miles which at present has no outlet, and that is mainly caused by the river near Durrow being thoroughly blocked by stones.

5202. It would bring the water, I presume, down into the River Nore with greater rapidity and certainty?—It would; and that is one of the points that have been mentioned to me as an objection to the scheme that there may be consequential damage that would come from bringing that water into the Nore.

5203. Do these circumstances point, in your mind, to the desirability of somebody having control of the whole drainage area of a river?—Decidedly, and of the river. I, myself, as a proprietor on the River Nore, and I should be perfectly satisfied to have the custody of the river given into the hands of a public body that would take hold of the river and take hold of the drainage.

5204. Of the whole area of land drained by a river such as the Nore up to the watershed?—Yes, up to the watershed. In the present circumstances of the country it may be said, and is very often said, we want to have centralization and not to work for ourselves, but I do say that in the present condition of the country, unless the initiative is in some Government department having extensive powers over the entire of the rivers, the drainage will never be carried out.

5205. The Chairman.—There is one question bearing on that which I will put to you as having had some experience of Parliament. Do you think that a compulsory Act, such as you suggest, could be carried through Parliament?—I think so, decidedly.

5206. That is, for taxing people without their consent?—I am perfectly satisfied that people would be quite content and very well pleased with it. To show you that, I might mention that we held a public meeting so far back as 1863, which was attended by

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the tenants, as well as by a few landlords, and they then agreed to have the taxation charged—that is, the Drainage Rate—on themselves directly, because one of the objections of landowners is that they find it difficult to collect the rent; and if you superadd the collection of the Drainage Rate, that increases the difficulty. We had the same difficulty with regard to the Arrears Act, and I proposed an amendment then by which the arrears, instead of being collected by the Treasury from the owners, should be collected by the Poor Rate Collectors, or other collectors. That is in the Arrears Act which was passed in 1882, and if the same provision, or an analogous provision, were put into a Drainage Code, namely—that the occupiers should first or primarily pay the Drainage Rate through the Poor Rate, that would enable them to deduct a portion of it from the landlord. If you wished to have it collected with the County Cess, none of it could be deducted from the landlord for the County Cess except on lettings since 1870.

5207. Mr. Murray.—That is a very valuable suggestion, but it was rather to another point that the Chairman's question was directed, which is this:—Whether a compulsory rate which would be levied upon occupiers without first taking their consent would be a mode of legislation which would commend itself to the House of Commons, and particularly to the Irish members?—I perfectly appreciate what it is; I do say that I am satisfied that the Irish members and the Irish tenants would be perfectly satisfied to have a compulsory rate for arterial drainage, with an inhibitory veto in the particular area.

5208. And you suggest that the rate on the land should be divided into parts which would represent, in the view of some public official, the value of each particular improvement?—Yes.

5209. Then, secondly, a general rate over the district for sanitation and for other benefits other than the mere improvement of the land for agricultural purposes?—I think that would be accorded to. Of course, I must say that, the great difficulty is the general one which will be shared in by both owners and occupiers, namely, that local taxation is so great that there is a great outcry, and in the great depression there is in agricultural matters even men who will say, "I wish the improvements to be made," are deterred by the state of agricultural matters in England as well as Ireland, and they do not like to incur any fresh burdens.

5210. Have you any views about what the rate on the valuation of the district should be. I think you said you thought there should be a rate on the valuation of the whole district?—I would certainly have a limitation, because if there was not a limitation you would frighten them.

5211. What would your idea be of the maximum?—I have not considered that, but it should be very small.

5212. Would it be 6d. in the pound?—It might be a maximum of 6d. in the pound; in fact I think a very small rate over a large area that would not frighten the people would be the solution of the difficulty; the smaller you could make the maximum rate and the more extensive the better.

5213. The Chairman.—Take 6d. in the pound, would that be considered an excessive rate for a maximum?—I certainly think it would—that is if it were carried out.

5214. Mr. Murray.—It is obvious you must not fix the maximum too low or else you would stop improvement.—Notwithstanding that, if you fix it high you will find a complete rebellion against it, and I will give you an illustration.

5215. The Chairman.—Before you give the illustration would you tell us what, in your judgment should be the maximum sum?—I certainly think 6d. should be the outside sum; I should go lower than that.

5216. How low?—I should say half that.

5217. Three pence for a maximum?—Yes, for a maximum; my object is to get rid of opposition. I will give you a strong illustration of that when the Tramway Act passed, in the Castlecomer district in

my county I entered into a company, it was then a popular measure, and I brought it forward; it is in a coal district, and within ten or fifteen miles there are no means of communication, and there are 80,000 or 85,000 tons of output annually, which in Ireland we consider very large; I formed a company and we intended to work a tramway, and we got plans and specifications and had Articles of Association and went to an expense of about £500. Under the Tramway Act the baronies were enabled to give a guarantee of 2 per cent., and the Government gave another guarantee of 2 per cent., but the baronies rose in rebellion against us, although it was only a contingent liability, and although we were personally liable; but I found that the feeling on the subject was so strong that I had to withdraw it, and we lost £500 on the transaction. That shows how dangerous it is to touch the ratepayers in the present circumstances, even with regard to a contingent liability. I give you that as an illustration to be extremely cautious how you impose any rate that will touch the ratepayers, on account of the opposition that we shall be obliged to make to it, because we are representatives of the ratepayers, and we could not control the ratepayers. The Hon. George Bryan, the owner of the mines, and some other persons who owned mines came in, and we went security ourselves, but notwithstanding that, the very limited and contingent liability was resisted by all the ratepayers, and they held meetings, and we were obliged to abandon it.

5218. Mr. Murray.—In that case was the baronial guarantee dependent on a vote of the ratepayers?—On the Grand Jury, and the ratepayers resisted it at the Privy Council. It had to go to the Privy Council in Dublin to be passed. I was on the Grand Jury and my constituents came to me about it. One of the reasons—and this is a most material thing to consider—was this—that we could not finance the company under a 5 per cent. perpetual guarantee. We could not get any money here on any other terms. Sir John Lubbock and others offered us money on those terms, but to go in for a scheme with a perpetual guarantee of 5 per cent., was a thing the ratepayers would not listen to. I think the ratepayers would have agreed if they could have got a 4 per cent. guarantee. I should have persevered and got it through, if I could have got it on those terms. That is the reason why I wish to have the maximum of a low character.

5219. The Chairman.—You would have the maximum of money and the maximum of time?—Yes.

5220. Thirty-five years you have mentioned?—That is what we should have agreed to—a guarantee for thirty-five years at 4 per cent. I would undertake as far as personal responsibility goes to-morrow to carry out the tram line in Castlecomer, if we could get the money on those terms, but certainly not on a 5 per cent. perpetual guarantee.

5221. Mr. Pir.—What would guarantee have amounted to in poundage rate in three baronies?—That would depend on the liability. I suppose the valuation of the Barony of Fermoy was now at about £57,000.

5222. What I want to know is whether the risk they would have run in the case of the Tramway would have amounted to 3d., 6d., or 1s.?—It was only a liability.

5223. But if the Tramway did not pay they would have had to pay for it out of the rates?—They would; but the Government gave a guarantee of 2 per cent., and if we got the money for 5 per cent., the baronies would have been liable for 3 per cent. The Grand Jury would not go beyond 5 per cent., and then there would have been 3 per cent. to be made up on the contingent liability.

5224. I wanted to find out what poundage rate frightened them?—They did not take that into account in the least degree. The liability was enough.

5225. The Chairman.—Without any sum being mentioned?—And on the ground that it was a 5 per cent. perpetual guarantee, and it was thrown out to them that the men who were financing it had money

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at a nominal figure, perhaps, lying idle at 24 per cent., and that they were making a very nice perpetual annuity for themselves; so that on that ground, without going into the consideration which is put to me, they threw it out.

5226. Mr. Barry.—Are these Barometrical Guarantees granted by the Grand Jury in the first instance?—In the first instance it is brought before the Grand Jury, and cannot represent the barometrical, and the Grand Jury have the determination of whether they will accept it or not. The Grand Jury are a body that does not represent in Ireland generally the occupiers, but still in this case they all agreed to the views of the occupiers.

5227. The Grand Jury having agreed to the Barometrical Guarantee, has it to be ratified by anybody else?—Yes. If the Grand Jury are agreed the Privy Council then consider it. There was an appeal from the Grand Jury to the Privy Council, but it must pass before the Grand Jury before going to the Privy Council, and the Privy Council have the entire controlling power to see if it is a right thing.

5228. If it passes the Privy Council is it settled?—Yes, and then it is left to private companies to take it up.

5229. As far as the Barometrical Guarantee is concerned it is settled?—Yes, it is settled.

5230. And any deficiency up to the amount of guarantee would be collected in the County Council?—Yes. In fact it would be part and parcel of the finances of the Grand Jury, and they would have to put that in from time to time, and should work the lines, no matter whether at a loss or not, and then the deficit should be taken from the Government and the ratepayers.

5231. The Chairman.—Have you any further observations you wish to make to us?—I have only desired to give you my view generally, and not as to particular instances. I have only given them as illustrations, but I wish to state to you distinctly the points to which I attach importance, namely—that unless you have some controlling power that will examine into these particular matters, and having reported on them, will leave them financed fairly; you will be thrown over, as we have been, in that particular place which I have mentioned, namely, Urrlingford. There we would work it ourselves, but taking the rest of Ireland the people are apathetic, and under the present circumstances they will not move in the matter.

5232. Mr. Barry.—Therefore you think the people of Ireland would be prepared for some mode of carrying out works of Arterial Drainage which would be of the nature of compulsory rating?—Subject to what I have said, I certainly think they would, provided you did not frighten them.

5233. Do you think they would have sufficient confidence in a Drainage Board such as the Board of Works?—They will not have the Board of Works. There is a great prejudice in Ireland against the Board of Works, because of its past history, in a great number of cases. A great number of drainages which have been carried on in Ireland were got up not for the legitimate purposes of drainage, but merely to employ people—a bad system—owing to the state of the country. The consequence of that has been that they have reacted terribly on the persons charged with those rates, and there have had to be supplemental Acts to relieve them. All this has caused a prejudice against the action of the Board of Works, and the Board of Works at the time when these works were sanctioned, for the purpose of relief instead of on the merits of the drainage, gave the charge of them to men who were incompetent and not engineers—agents and others—and in fact in my locality there was a gentleman who made a very strong attempt to drive water up a hill for some time. He went upon his judgment, without being a surveyor, or having levelled it or anything of that kind, and there was a great deal got upon the ratepayers which has frightened and disgusted people, especially when the object of

the Government was to give employment, because that was the primary object. That has prejudiced the country against the Board of Works, unless it can change its name and, unlike the rose, under another name, will smell more sweet.

5234. You think they have been unfairly treated?—Certainly. I think there should be a shifted Drainage Board, apart from any political considerations.

5235. The Chairman.—Of course that Drainage Board must have District Boards to carry out such schemes. How would you have those District Boards under the main Drainage Board of Ireland, we will call it, constituted—partly of owners and partly of occupiers?—That is what I should like. I should like to have those occupiers who are really interested under the recent Acts of 1870 and 1881 to have a voice. What the proportion of that voice should be is another question. I should give them a two-thirds voice and one-third to the owners, because the tendency is that a great number of them are making purchases under Lord Ashbourne's Act. I think if there was this Central Board it must be in connection with the Drainage Districts.

5236. And a Drainage Board consisting of two-thirds occupiers and one-third owners?—Yes, and I think then if that was put in work you would find that a large number of those men would decidedly assent to a compulsory rate if it was put down to a small maximum, but I was giving you the history about the Castlecomer Tramway and the rebellion against our getting it, so that you may see it is a difficult thing, because the country is in a prostrate condition at present.

5237. Mr. Barry.—Would you explain what you mean by assenting to a compulsory rate. I thought the drift of your former evidence was that the rates should be made without consultation with the ratepayers?—What I mean is that supposing the District Drainage Boards put themselves into the hands of the Central Board, that then they should submit; but I should give them the option of whether they would accept the drainage scheme. Then once having accepted the drainage scheme I would say they must take the natural consequences, but I would give them the option of saying, we will not adopt it in a district, without our voice you shall not act. But once they have agreed, whether the number of assents might be, then the other executive matters should be put in the hands of the Central Board, and that would prevent confusion and dispute between the Local Boards.

5238. What proportion of assents would you think desirable?—At present it is fifty per cent., and I should be quite satisfied with that if you adopted the statutory terms, that is if the new occupying tenants were admitted. If that were done I should be satisfied, and I think they would be satisfied, and the thing would work.

5239. The Chairman.—Fifty per cent. of each class?—Fifty per cent. of the occupiers and fifty per cent. of the owners.

5240. Mr. Barry.—Do you mean fifty per cent. in value or fifty per cent. in individuals?—If you put fifty per cent. in individuals that would be too small a proportion for the owners.

5241. Mr. Shaw.—At present it is a question of value?—Yes, I say it would be much better to say in value. I think there would be little difficulty if you can get over the primary liability being on them, that is the main point.

5242. Mr. Barry.—It has been represented to us that there is a considerable difficulty in introducing the schemes on account of the preliminary expenses that have to be incurred?—Yes, that is so.

5243. And that some improvement should be made in the direction of a Central Board finding all, or some proportion, of the preliminary expenses on the demand of a certain number of the people interested. Have you considered that point?—I have considered it, and I think that that would be most essential, for I found



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the greatest difficulty in the case I have been speaking of in getting the tenants to come together and subscribe; in that case they did it, but it is an exceptional case further to advance money and run the risk of being thrown over as they have been.

5244. What proportion of the parties interested would you suggest should be qualified to put the Central Board in motion?—I should take a district, such as our district, of whatever area it might be, and I would take the owners and occupiers of that district, and I would see what would be the proportion. We will say 50 per cent. If there were 50 per cent. of assents, I would hand it on to the Central Board, and let them initiate it, and put it in motion.

5245. The Chairman.—Would you prefer that there should be a certain percentage of assents to the Central Board, sending down a properly qualified person to survey the district, and that they should decide themselves whether it was desirable to carry it out or not without getting any further assents?—I decidedly would. What I meant to convey was that the Central Board should first discover or find out where it would be desirable that they should initiate a drainage, and then I would give the power to the local parties to say whether they would accept it or not. I would give them the power of negotiation or veto.

5246. Mr. Barry.—My question was how would you put the Central Board in operation in the first stages of the inquiry. Would you do it by memorial of some of the inhabitants, or would you consider it the duty of the Central Board to roam about Ireland, and find out districts for itself?—You have the County Surveyors of Ireland, who are a body of men conversant with the nature of the country, and they might furnish a report if no local parties initiated it; but supposing you gave the local parties power to nominate, and then there was a reference to the County Surveyor and a report from him, and then on his report the Central Authority might send down a man to make all the necessary surveys.

5247. After that stage has been passed through and the Central Board has studied the question, then you would say consult the parties interested, and if 50 per cent. in value said "go on," the Central Board should go on, and all the necessary steps should then be taken under the direction of the Central Board?—Undoubtedly, that is what I should do, but then I would put this forward. The question then is what the amount of the drainage rate should be on the amount advanced. For instance, there is this question of sanitation which I was speaking of with reference to the town of Urringford. Under the Public Health Act you get money for 5½ per cent. over sixty years, and if the question of sanitation is brought in, it ought to bring in money at that rate. I think, therefore, on

the main and great point you will find no difficulty if you give money at what I call a fair commercial value.

5248. The Chairman.—At present the money is obtained at 8½ per cent., with a 1½ per cent. sinking fund?—Yes. Then I do not think I have anything more to bring before you, except this. I have given you generally my views upon the matter, but I should have been prepared if I had known you would have cared for them, to give you all particulars, and I could have produced the plans and specifications that would have illustrated it better.

5249. What we wanted was your general opinion upon the whole scheme, and not any details, and I think you have given us that?—Yes.

5250. Mr. Pin.—You said that Mr. Fowler had agreed to include the fifteen years' termases under the definition of "owners." When he agreed to do that, was that in a Bill then being brought in?—That was not on the Bill as brought in. It was in 1886, this time twelve months.

5251. I have here the Bill of 1885?—It was not in that Bill.

5252. There is a provision in that Bill?—"Substitution of tenant for owner for the purpose of this part of the Act." That enabled the landlord to allow the tenant to be substituted for himself?—That is by consent, but in the Bill of 1883 they have put in the copyhold termases, which would represent them. There has been no Act. In 1883, 1884 and 1885 there were Bills brought in, but it was only in 1885, this time twelve months that Mr. Fowler showed the present new measure to be in an owner.

5253. You said that the local taxation in your district was very heavy?—Yes.

5254. Can you give us any idea of what it is?—That is in the Castlecomer district and Urringford. Urringford is not so high as Castlecomer, but the roads in Castlecomer, owing to the want of a tramway, cost from 3s. to 4s. 6d. a perch. The mere county cess for the maintaining of the roads is from 3s. to 4s. 6d. per perch over the whole district.

5255. Is that owing to their being cut up by this coal traffic?—Yes, with the cess, and there being no tramway. Our local taxation consists of the county cess and the poor rate.

5256. Can you tell us the rate in the pound on the valuation of Castlecomer?—I can tell you locally what it is. The poor rate in Castlecomer is varying from 5s. to 3s. 6d. in the pound. The county cess collected twice a year would be between 2s. 6d. and 3s. 7d. in the pound.

[The Witness withdrew.]

Adjourned.

## TWENTY-NINTH DAY—FRIDAY, FEBRUARY 25th, 1887.

32 ABBINGTON STREET, WESTMINSTER.

The Commission deliberated.

March 8, 1887

## THIRTIETH DAY—TUESDAY, 8th MARCH, 1887

35, MERRION-SQUARE, DUBLIN.

Present—James Abernethy, Esq. (in the Chair); T. Wolfe Barry, Esq., and J. T. Pico, Esq.

Mr. William Harris, C.E., called and examined.

Mr. William  
Harris, C.E.

5257. The Chairman.—Kindly state your position?—I am a Civil Engineer of some forty years' standing, and I hold the office of County Surveyor for the County Donegal.

5258. Have you any remarks to make on the subject of arterial drainage?—I believe everyone is agreed as to the importance of arterial drainage where it is practicable. Perhaps one of the difficulties in any case would be that we have not an opportunity of making much effort in that way; but the principal work of the kind that we have had in the County Donegal is one that I have carried out myself most successfully—the Swilly Drainage. The district embraced by the Swilly Drainage extends from the Foyle up to the richest part of what may be called the garden of Donegal. There are one or two others spoken of, which I have been consulted upon more or less directly—one of them is called the Leman River Drainage. It goes from Rathmellon in a north-westerly direction through the county. I have brought a very good map with me, which I have outside the door. It is very large, and it will enable you to see the whole physical features of the County Donegal, if you will allow me to show it to you.

5259. Kindly let us see it. (The witness produced the map.) You have the whole county of Donegal shown on that map, with the drainage districts. In order to give you information upon other subjects into which you are inquiring, I have also marked upon it the townways proposed, the townways passed, and the entire railway system of the county. Every portion of our traffic, as you will see, leads in direct lines to Londonderry from every part of the county. The drainage work which I have carried out is also marked upon it. You will see it extends about seven miles north of Lifford up to Raphoe. The Leman district extends from Rathmellon through Lord Leitrim's property, by Killymore to the west.

5260. Mr. Barry.—Is there a lough at the head of it?—Not exactly at the head of it. There is a well-known lough in the district.

5261. Is it Lough Gortan?—No, it does not extend to the Lough Gortan district. It goes beside Lough Fann; it then extends beyond the village of Killymore, and it is beyond that the lands to be reclaimed principally lie, a little to the westward.

5262. Does Lough Gortan discharge into the Leman?—Yes. There are, of course, a few lesser districts which would benefit by drainage, and there are some mountainous tracts that need scarcely be talked of. They are capable, no doubt, of reclamation; and anything that is done in that way must, of course, be beneficial; but the district is so far behind the times that I do not think that for the next two generations the people will ever think of entering upon it.

5263. What district is that?—Up by Lough Beg, a long straggling lough, which runs to the summit level that divides the western and eastern parts of the county. I do not think the next two generations will enter on the work of draining that district. Some of the districts towards Glenties would be capable of reclamation, but I regard the reclamation of them as

outside the requirements of the present generation. In the same way there are other parts of the county Donegal that would be improved by being drained, but it is not wanted in the present time. Donegal is so set up by various mountain ranges that you have really no district of any consequence to enter on thorough arterial drainage for, but we have what may be called minor districts, which could be improved by main drains, requiring to be opened from time to time. Owing to the configuration of the country, the water is carried so rapidly that we have no floods except on the portions of the county I have referred to. As I have said, we have some smaller districts which no doubt would be better for the application of some drainage law, where there are not many proprietors concerned.

5264. Have you any remarks to make on the effect of drainage on the climate of a district?—I am quite sure the effect of drainage on the climate of the county Donegal would be absolutely nil. With a county washed on all sides by the Atlantic, with a deeply indented coast, and with a number of lakes all over it, and extensive river courses, a few hundred acres of flood-moor or less, would have no appreciable effect on the climate.

5265. Referring to the Swilly Burn drainage, what has been the effect upon the value of the land?—I will come to that in a moment. I may mention with regard to the climate, that the rector of the district declined to pay for fine weather, unless the congregation petitioned him to pray to God to take away the Atlantic Ocean out of that. He said it was not the least use praying for fine weather, so long as the Atlantic Ocean was so near. I ought to say that I refer to the late rector, not the present. I may add that we have had some embankments of rivers, which I have carried out—one of which is a very good one indeed—on the Erne estate near Lifford, and which has been productive of the very best results. It is skin, in point of fact, to arterial drainage. It has enabled the river to do its duty effectually, which, owing to floods, it could not do before; and the consequence is that on it and the Swilly Burn the people have sowed crops on land which was formerly covered with floods. It was a common calculation in that part of the county to allow for a loss of crops one in every three years.

5266. What is the length of the embankment?—About two-and-a-half miles. It came round a bend of the river.

5267. What height were the embankments?—They were twelve feet six inches high. The lands there were subject to tremendous floods. The Moorne and Foyle rivers meet in the vicinity of those lands, and when there is a thaw on the mountains the whole of the water is precipitated down on the low lands and they are covered.

5268. Are those embankments on the margin of the river?—They are a very slight distance from the margin. It is much better to have them at some distance from the margin. You get them out of the wear and tear of the floods, and you have a useful piece of ground between the embankment and the river.

5266. Have you had any difficulty in maintaining the embankment?—No; I have not seen a single soil out of this one yet.

5267. Mr. Pies.—How long has it been made?—Between four and five years, and it has stood some tremendous floods.

5271. At whose expense was it made?—At the expense of the tenants. The money was borrowed by Lord Erne from the Board of Works. It was on his property.

5272. There was but one landlord?—Yes; in that week we had only to deal with one landlord. Lord Erne's property lies in that angle of the county.

5273. The Chairman.—About what was the expense?—I think the cost of the embankment was about £5,000, and the sum protended is about 250 statute acres. As to the increased value of the land, I have not made any calculation of it: but Mr. Kelly, the best inspector under the Board of Works, calculated confidently upon a return of seven and a half per cent. on the Swilly Burn. I am quite sure it is much nearer to three times that in every way. The people have now the greatest possible confidence in being able to save their crops. They are able to save them on the land now, instead of having to carry them up the country, as they had to do before. The return has been, I understand, very great in the way of crops.

5274. Mr. Pies.—Is the embankment on both sides of the river?—No, only on one side.

5275. The Chairman.—Then it must have the effect of course of throwing the floods upon the lands on the opposite side?—Yes; the Foyle at that place is almost a nuisance. It bifurcates near that spot. We do send the water very much to the opposite side. Of course that was not intended, but that was the effect of the thing. Owing to the bifurcation of the river, and the want of some body with power to deal with it, neither channel is effective, and both are partially filled up and flood the lands, throwing the water back, and one of the results is, that the town of Stoleane is subject to floods.

5276. What is the character of the lands on the opposite side of the river?—A very rich alluvial deposit.

5277. Would an embankment constructed on that side of the river have the same effect in preventing floods as the one you have constructed?—Yes, if properly made. I should mention there is a partial embankment on that side also, but my embankment is twice as solid as theirs.

5278. To whom does the land on that side of the river belong?—Chiefly to the Duke of Abercorn.

5279. Mr. Pies.—Have you had any difficulty with the drain at the foot of the embankment for draining the land itself?—No; the worst thing about it is you have to widen it, and make it a sort of reservoir. The tide flows up beyond Lifford, and percolates under the bank. The back drain becomes a sort of reservoir, and remains so until the next tide, when the sluice carries it away.

5280. You have a siphonage?—Yes, small sluice gates at the end of the drain drain into the back drain.

5281. I think you said some works of a similar character have been carried out on the opposite side of the river?—There have been; they have made banks, but not strong enough. They made them according to their own local ideas, and I have seen portions of them carried away, and a short time ago the whole country was under water.

5282. Mr. Barry.—Who looks after the maintenance of the embankment you made. Is it supposed to be looked after by the tenants of the adjoining lands?—That is exactly the point that some legislation is required for. The embankment is subject to a most shocking amount of cattle traffic and trespass. What is everybody's business is nobody's. The consequence is, that for want of looking after, the works suffer, but

as I have said, I never have heard of a breach in one of them yet.

5284. Was the embankment carried out under any drainage board?—Yes, it was done under the Board of Works.

5285. Mr. Pies.—Was there a local drainage board also?—We had no local board then, and I looked after it myself.

5286. Mr. Barry.—Was there a local board in the case of the Swilly Burn Drainage?—No, we had an Act of Parliament, and there was no local board.

5287. Mr. Pies.—I presume Lord Erne borrowed the money under the Land Improvement Act?—Yes.

5288. The Chairman.—Referring to Query No. 3, as to the Acts of 1843 and 1853, have you any observations to make?—As to the Act of 1843 I know very little about it. The Act of 1853 is the one we have been working under, and the Act that really concerns us. I have told you shortly the chief work we have carried out under it, which is the Swilly Burn Drainage.

5289. Have you any suggestions to make as to changes in the law regarding drainage?—I have. There is one very serious cause which interferes with the carrying out of drainage improvements, and that is the apathy of proprietors. In point of fact they have lost interest very much in everything of the kind. In the case of the Swilly Burn drainage we had the greatest difficulty in getting the assent of the landlords. They feel an indifference to it, and think there is no use in troubling themselves about those matters. I know that was the feeling I found generally prevailing in the country.

5290. To what do you attribute that feeling?—Chiefly to the unsettled state of property in the country. The landlords say:—"We have no interest—the tenants are the men in possession now."

5291. What changes in the law do you think would be beneficial?—I think the whole proceedings as the law at present stands, are cumbersome, and I might almost say oppressive, to parties who want to promote anything of the kind. In the first place, you have a great deal to do in the way of preliminaries. You have to serve notices, and struggle to say they are to be served not on the occupiers, but on the proprietors, who are the parties best interested in the matter, especially in the portion of Ireland we have here to deal with, where tenant-right exists to the extent it does. In fact I look upon the tenant as really the proprietor. The landlord cannot put him off the property without paying him every penny of his tenant-right. I know myself that in the case of the Swilly Burn the tenant's interest was fully equal to the landlord's. The tenant pays as much for the tenant-right, taking it at 5 per cent, as he pays the landlord in the shape of rent. And when you have a rent fixed for a term of years, any improvement in the soil is the interest of the tenant in the mean time, and in fact the tenant seems to me to be the only person who has anything to do with the matter at all.

5292. You think the notices should be on the tenant?—Certainly. I think the whole proceeding ought to be taken as for the tenant's interest. Under the present law you serve a notice on the proprietor, asking his consent, and he may say either yes or no. He may say, "I have no interest in the land; I am not getting on well with the tenants, and I don't care about them," and the tenant may be injured by the refusal of the proprietor, whereas the tenant being the party really most interested, ought to be the party to consent, for you cannot injure the proprietor by carrying out the improvement. Then as regards the matter of expense, it appears to me to be exceedingly cumbersome and unnecessary—especially when you come down from large projects, such as I see you have been examining into on the Bann and other parts of Ireland (which I happen to know a little about), when you come down to what is really the important matter in drainage; works to which, perhaps, the term "main

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drainage" would be more applicable than the term "arterial drainage," you want some short and ready way of forcing misopposed parties let them be tenants, landlords, or anything else, you require to have some way of preventing them from keeping back the water and flooding the lands above them. That should be done by a summary proceeding. It appears to me it could be done very easily, in the same way that you make a public road through people's properties. I do not see any difference as regards that between a road and a drain. When a new line of road is proposed to be made, you leave a notice with every man through whose land the road is intended to run, stating that the road is proposed to be made, and that so many perches of it will run through the townland of so-and-so, and that a map of it is deposited with the Secretary of the Grand Jury. I do not know whether that is in the notice, but it is the fact that a map of the work is deposited in the office of the Secretary of the Grand Jury. If the proposed presentment is over £50 in value, it goes before the Grand Jury, and they simply publish the fact that it has been before them, and that they have no disposal of it. It then goes before the road session again, and they either pass or reject it, and it then comes before the next Grand Jury and the Judge at the Assizes, where it may be traversed. You require no Act of Parliament, and the whole proceedings are exceedingly simple; there is ample publication, and no person can be damaged. I think some analogous proceeding might be adopted in the case of drainage.

5203. In the case of large districts, do you think they should be under the jurisdiction of one Governing Body?—I think so, and I am of opinion that that body must be elective; but it would be absolutely necessary to have your executive independent of the local body. I can speak from a good deal of experience in saying that I know no class of men who are so dead to their own interests as farmers. No doubt they are not as ignorant as they used to be, but if you were to ask most of the farmers in the country what the nature of the soil of their farms was, they could not tell you whether it was granite, slate, limestone, or anything else. I think it would be absolutely essential to have your executive entirely independent of the local body. I will give you an instance, for there is nothing like a case in point to show you the sort of difficulties we have to contend with under the present law. In the year 1879 I was applied to on the part of Lord Enniskillen and the Duke of Abercorn, to undertake the Swilly Burn drainage. I do not know a more useful instance of the difficulties that beset the present system than the one I am going to tell you. You must excuse me if I have got a little out of the groove now. I am mentioning the matter as it has occurred to me. The proprietors were very anxious that the thing should be carried out without much expense; and accordingly I did the whole business, what ought to have been the solicitor's, as well as the engineer's, myself. The matter went before the Board of Works in the usual way, and the plans were laid before them. The Board of Works have no officer responsible for the investigation of such projects. They are obliged to employ men who may be recommended to them for employment, but who may not be, and as a matter of fact are not, up to the mark. In my own case they selected a gentleman who had already blundered in his engineering with railways, and who was a very extraordinary sort of man altogether. I had some strong provisions actually had to threaten him with an indictment, and very nearly carried it out, for his treatment of the county roads. This gentleman had strong feelings against myself personally, and it was he that came down from the Board of Works to inspect my drainage plans. He stayed for three weeks examining the place, and wrote out of the most extraordinary reports I ever read, extending over a great many sheets of paper, and condemning the whole

thing. I protested, but the Board of Works would not alter their decision, they acted on the report, and rejected my scheme. I asked Lord Abercorn to contest the matter with them, but he would not do so, and the thing fell through for a time. After a while, in 1881, we had a famine, and although it did not directly extend to this locality, still there was more or less distress here, consequent on the distress in other districts. I was applied to again in reference to the drainage; but I refused to have anything more to do with it. In 1883 I was again appealed to, to take the matter up; but Lord Abercorn would not contest it with the Board of Works, and the plans were thrown back at me. After an enormous amount of trouble, I went into the whole thing again; I relodged the same identical plans, and this time the Board of Works selected a gentleman of eminence in his profession; he came down and inspected the locality, and the result was he passed the whole of the plans with cold that had been rejected before, and complimented me on my project. Not a single one of the other men's views were supported, and the only changes that were made were a few minor ones, which he had never referred to at all. These plans have since been carried out; but now comes another difficulty, which has reference to the local authority. There were some very intelligent farmers on the local Board, but some of them were men who believed they were engineers, and one of them proposed certain changes in the plans which were futile, and really childish, when you looked into them—at all events, they were such as I could not recommend. The result was the Board became incensed against me, because I would not consent to waste money in doing things that my scientific knowledge, such as it was, showed me were objectionable. They had not been recommended by Mr. Kelly who examined them, and I disapproved of them, and declined to adopt them. There was a row at the Board, and although we had then nearly completed the work, they showed their ill feeling by dismissing me, and would not pay me a penny of my fees. I took an action against them for wrongful dismissal, and for the fees due, and when it came to trial, they turned tail, the whole thing collapsed, and I got a verdict. That shows, I think, the necessity in the drainage department, and the same thing presses me very much in the other department, which I am not here to speak of to-day—that of County Surveyor—that while your executive officer of course, should be properly responsible to those who are competent to judge, and make him do his duty, you should not leave him at the mercy of a set of jobbing ignorant local people.

5294. With reference to query No. 9—whether government should take the initiative in drainage questions—have you any observations to offer?—As regards that I do not see, so far as I am concerned, any necessity for the Government interfering.

5295. You have mentioned that the embankments you formed at one side of the river had the effect of turning the floods on the lands on the opposite side; what precautions would you recommend to be taken to prevent an occurrence of that sort?—I think people should look out for themselves. If the people on one side of a river carry out a work of that kind, the people on the other side should come forward at the same time, and certainly, where the districts are opposite margins of the same river, or where they are in the same locality, I would put both under the same management.

5296. As I understand, you recommended that there should be more Government supervision?—I think there should be supervision by some scientific man, and that the executive officer should be responsible to some one competent to judge, not to a local Board, who would only interfere with and worry him.

5297. Mr. Pitt.—What, in your view, should the duties of the local Board be?—The duties of the

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to watch the progress of the work, see that the money has been properly expended, and if they see anything objectionable going on, to make their objections to some authority competent to decide.

5398. You think they should complain to the Board of Works, or to the central authority, whatever it might be, if they thought the engineer was not performing his duty satisfactorily?—Yes.

5399. You would not allow them to interfere with the engineer themselves? Certainly not. We have an instance of the inconvenience of it in the Swilly Burn drainage—that was one of the things that led to the row. One of the members of the local Board, a man holding a very respectable position, wanted to be engineer and everything else. There was a drain going down into the main drain, and it turned when within about five or six perches of the river course. I ran it straight down, and this man made the greatest hubbub about it. He said it was bad engineering, for that there was a loss of fall as between the course in bank and the previous course, which turns with the stream, and went further down, about a chain's length. The gradient was about two or three feet in a mile, and I need not tell you the loss of level in a chain's length with a gradient of two or three feet in a mile was wholly impracticable. Again, there was a point on the river, at which Mr. Kelly agreed with me, and said I had done properly, which was to leave the natural course of the river alone at that spot, because the water was sluggish, and any attempt to straighten the river would have no effect where there was no current—in fact it was near the junction, but some of the local Board insisted that it was a great oversight on my part. They suggested an alteration in the work which would have been perfectly useless, but they would not see it, and when they ordered me to do it, I said that I must refuse, and that I could not repeat a thing to the Board of Works to be right which I knew to be wrong. It turned out since that I was correct, and the two Inspectors concurred with me and let my plan stand. I should mention one point which was near escaping me. It is in reference to levying portions of the expense of the work upon certain districts. When a large drainage work is carried out, the bridges all along the river have in many cases to be altered, and as a rule, they are taken down and rebuilt. As the law at present stands, half the expense is levied upon the county or borough, as the case may be. I do not see why that should be the rule, unless it could be shown that the new bridge was a very great improvement to the county throughout. There were five or six bridges on the Swilly Burn, and every one of them was taken down and rebuilt upon a different plan, but so far as the county traffic went, they were just as good in their former condition as they are now.

5400. Was the waterway of the bridge increased?—Yes, and they are no doubt better constructed than the former bridges, but practically the county was as well off as far as convenience of traffic was concerned, before the alterations were made. The result is that people who have no drainage, and who want no drainage, and who are in no way benefitted by the work, have to pay a portion of the expense of a work in which they have no interest, and no representation.

5401. Mr. Barry.—Did the county contribute to the building of the original bridges?—Yes, I believe so.

5402. Then does it not occur to you that they built it too small in the first instance?—Too small for drainage, but not for traffic.

5403. I mean for drainage; ought not they have built it sufficiently large in the first instance to answer the requirements of drainage?—As to that, I do not think they were called upon to anticipate all future time, and to build bridges of a larger size than was necessary to answer the requirements of the times when they were constructed.

5404. It will scarcely be contended that they had a right to build bridges that would merely suit the traffic, irrespective of the drainage; and as a matter of fact did not the bridges throw back the water?—They did; but I should mention that no one can tell at the present time how or by whom some of those bridges were built. Some of them were built partly by public subscription, and some were paid for by local boards.

5405. The Chairman.—Since the bridges were rebuilt have the floods been lessened?—Yes.

5406. Mr. Barry.—To revert to the subject to which you have just now called attention, I take it to be your opinion that the tenants are sufficiently enlightened to initiate schemes of drainage, but that they ought not to be put in command, or have the power of dismissing the engineer?—Certainly.

5407. You think they are sufficiently alive to their own interests to promote a Drainage Board?—Yes.

5408. But that after they have taken that step, the prosecution of the work should be to some extent under the Board of Works?—Yes, or some central and competent control, because in some cases local Boards get angry with the engineer because he won't carry out jobs.

5409. In fact, you would put the engineer in something like the same position as a County Surveyor, and not be dismissable, except by public authority?—I would have him dismissable only by public authority. The County Surveyor is dismissable by the Lord Lieutenant or by the Grand Jury, and thereby hangs a very ugly tale. We tried to have that amended, and we got a Committee of the House of Commons appointed to inquire into it, but the witnesses were told to hold their tongues. I have tried under their own hands, and in every way I was debarred from using the interest they possessed to make the ground firm under their feet in the discharge of what is sometimes an unpleasant duty. I need not tell you that we must from time to time knock our heads against local parties. In fact, I have to do it every day. I do it especially with contractors and cesspayers. The contractors are themselves cesspayers, and they have friends among the cesspayers of the system. In some cases cesspayers have lost money to the contractors. Then, unfortunately, when you go a grade higher in the social scale, the higher grade does not exclude human nature. I find I have to knock my head sometimes against Duke's and Earl's, and men of high position and influence in the country. And it is not one man in a thousand who would be able to fight his case against the influences brought to bear upon him. I have, somehow or other, been able to take care of myself, and to "fight my own corner," as the saying is; but I have always found what I have referred to the greatest possible difficulty and burden to me in the discharge of my duty. I do think, in view of the public works which it is said are likely to be carried out as the result of this Commission,—perhaps I ought not to anticipate, but townways are about to be carried out, and drainage works in various parts of the country are, it is said, to be undertaken; and if the public officers who have to carry out those works are not rendered independent of such influences as I have referred to, and protected against being taken at a disadvantage, I think the consequences to the public service will be most serious. I have myself unfortunately been obliged,—and every single thing that I have done has turned out correct—to set myself against the execution of a number of townways into districts that never would pay, but which was tried to be forced on; and which if they had been constructed would be hanging about the necks of the cesspayers and their children for generations, and my action in the matter has brought me into a good deal of odium.

5410. Mr. Barry.—You gave us the instance of a road, which is about to be constructed, what is the

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 Mr. William  
 Harris, C.B.

machinery by which the land is acquired for the purpose of a road!—The first thing is, two co-adjutors lodge an application with the Secretary of the Grand Jury, and notices are posted—which is a most absurd process, but which was intended to be good—on the doors of the police barracks, of the intention to apply at the following Road Sessions for the construction of a line of road from A to B, and passing say, for 150 paces through townland C, 20 paces through D, 250 through E, and so on. This notice is printed by the Secretary of the Grand Jury on the list of applications, which is supposed to be issued before the Road Sessions come on, but practically it is only issued on the morning of the Sessions. The Sessions express their opinion upon it, after hearing, by solicitor or otherwise, the parties interested. It then goes to the Assizes, and if it is

under £50 the Grand Jury dispose of it at once, and pass or reject it, but cannot modify it. If it is over £50 the Grand Jury simply mark their opinion of it, and it goes again before the Sessions, where it is reheard, and may be modified. It then goes before the next Grand Jury, and if parties are still opposed to it, and that the Grand Jury pass it, the opposing parties have the power, by lodging notices with the Secretary of the Grand Jury, of traversing it before a petty jury.

5511. How is the value of the land taken assessed?—I have some cases of it coming on to-morrow or the day after. The parties are notified, and they go before the judge and a petty jury, and assess the damages. It appears to me that the same kind of plans and sections that are used in the case of a road would answer for a drainage.

Major Henry Corbet Singleton called and examined.

Major Henry  
 Corbet  
 Singleton

5512. The Chairman.—Are you a landed proprietor?—I am, and I am also one of the trustees of the Ardee Drainage Maintenance.

5513. Have you been furnished with the printed list of queries?—Yes, but I did not attend search for that. My object in coming here is to make a statement to the Commissioners. I have been requested by my fellow trustees of the Ardee Drainage to come before you with reference to the increase which has taken place lately in the floods. Last year we had four what you might call excessive floods. There are 41 families, numbering 507 individuals, living on the Ardee bog, and these people were flooded out of their homes. Many of them were living on the bog even before the drainage was carried out, and a great number of their names appear on the award. In March of last year we had an excessive flood, and these people lost the whole of the crops that they had sown. The water was over their heads certainly for nine days. We had another flood from the 15th to the 15th of May, and on the 15th of October we had a very excessive flood, and the whole of the crops that were left were destroyed.

5514. Mr. Barry.—Is this bog in the district of the Ardee Drainage?—It is, and the people's names are in the award.

5515. Mr. Pitt.—When was the Ardee Drainage carried out?—The date of the award was 1854. It was finished in that year.

5516. What was the amount expended?—The entire amount was £22,380 of which £1,355 was charged to the counties of Louth and Monaghan, £9,320 was charged on the lands benefited, and the balance, £11,005, was supplied by the Treasury.

5517. The Chairman.—Were the lands subject to floods previous to last year?—They were, periodically, but not so much as last year. We had four excessive floods last year; of late years the floods are greater, the water comes down from the upper district much more rapidly than formerly. Whether it arises from the change of climate, I cannot say, but for some time after the drainage was completed, the flooding was not so great; we had no floods for some years, but lately the floods have been very severe.

5518. Mr. Barry.—What was the nature of the drainage works?—Deepening and altering the course of the river and minor streams.

5519. Was there any embankment?—No; unfortunately we did not construct any embankments. I possess some maps showing the locality.

5520. What is the extent of the drainage district?—Up by Achree house, from Hann bridge to Bogie bridge. Between those points the river falls about ten feet. It overflows its banks in three places, and the

public road is carried along a causeway over which the water flowed, near Bogie bridge, in October last.

5521. Is the waterway of the bridge insufficient?—Yes; but October the entire district was covered with a sheet of water.

5522. You say that for some years there were no floods?—Yes, and a great number of people came to live on the bog; fully forty-one families suffered from last year's floods, besides others who live on higher land.

5523. To what do you attribute these floods?—I think the water comes down more rapidly than it did formerly from the Nobber district; also from the Keerna river, the Boguesdown river, especially at a place called Gernagh bridge, and the Drumcondra river—all these rivers feed the district, and at Gernagh bridge the water is thrown back by some high lands, and floods the low lands.

5524. I gather from your remarks that the reason of the increased floods is that drainage has been improved in the neighbourhood?—Yes, and the outfalls are not kept up as they ought to be; I consider that has a great deal to say to it. On some of the old bridges the arches have been stopped up; I know one that has been stopped up with bushes and stones. Everything was done as far as I can see that could be done by the Drainage authorities to deepen the river, and there is no doubt it has been beneficial when the water was low; but when the water was high and met an obstruction, and was thrown back in consequence of the former outfalls being stopped.

5525. Mr. Pitt.—Is not the upper part of the river under a separate Board?—Yes, the Nobber district, above Achree, is under the Nobber Board.

5526. When was that district formed?—About the same time as the Ardee district.

5527. The Chairman.—You have a separate Board for the Ardee district?—Yes; we have got a maintenance Board, which meets periodically—in fact we assemble to-day, but we have got no power, except to maintain the existing works.

5528. That is the works of 1854?—Yes.

5529. You have no jurisdiction over the Nobber district?—None.

5530. Would you recommend that both districts should be formed into one, and placed under the same management?—I think the Board of Works should have some jurisdiction to compel the parties to keep the drains open. The Drainage Boards have no power to look into many matters that should be looked after. I know in one case a miller who left the country, and before he went away he took up some of the sluice gates, and went away with them. It was found out, but the man had left.

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Major Henry  
Coblet  
Baginham.

5331. What is the acreage of the lands relieved by the works of 1854?—It is all shown in the sketch. The total is 0,360 acres, and the area of the land drained is 2,500 acres.

5332. Have you any estimate of the increased value of the land in consequence of the drainage?—The grass lands have been considerably increased in value; there is no doubt about that, because, even in summer time, people used to be able to sail boats over hedges and fences previous to the works. Now, they are for the most part dry; but on the few occasions I have mentioned they could have done the same.

5333. Mr. /Yes.—Do you think the channel of the river has silted up to any extent?—I think there is no silt at all, in some places.

5334. If so, why has not the Board who have charge of the maintenance kept it properly cleared out?—Well, where we suffer most—the difference between the level of the weir and the bottom of the river at Bogy bridge, is only nine inches.

5335. Within what distance in that fall?—I dare say about two miles. Bradley's weir is at Ardee. It is there the great damage takes place.

5336. Is that a four mill?—Yes.

5337. Is it working?—Yes; there are two flour mills; one is called Hale's mill, and the other Bradley's mill.

5338. There is no obstruction beyond Ardee?—No, we have nothing to complain of beyond Ardee. The lands are high on each side, and there is plenty of fall, but there is no fall between Ardee and the bottom of Bogy bridge. There is a fall of ten feet between Bogy bridge and Burley bridge.

5339. Would there be any difficulty in embanking the river there?—I think not, and in my opinion it ought to be done. I lodged with the Chairman of our Committee a statement showing the necessity for embanking the river between Bogy bridge and Ardee, but then there is this question—from the bottom of the river at Bogy bridge to the silt of the mark is eleven feet two inches, and the river lacks up to that.

5340. It rises to the arch of the bridge?—Yes; when it meets the obstruction below Burley bridge, caused by the high lands, the river overflows its banks something like eight feet, it looks up, and the question is whether any possible embankment could be of use.

5341. The waterway of the bridge is too small?—Not the waterway of the bridge; but the waterway of the banks of the river below Burley bridge is too narrow, as left by the Board of Works.

5342. Have you any surveyor or engineer in charge of the Ardee drainage works?—Yes, we have got a man in charge of the works. I may mention that we have only got to maintain what has been done; we have no power to widen the stream.

5343. Is Burley bridge near the mill?—No; Ardee bridge is where the mill is.

5344. Burley bridge is above Ardee?—Yes; it is the first main bridge above Ardee.

5345. Does the mill at Ardee affect the drainage?—Yes; it is one of the main causes of the floods, both the Hale weir and the Bradley weir. There is a fall of fifteen feet thrown back by these mills.

5346. The Chairman.—Are there any sluices in those weirs?—Yes; there are four sluice gates.

5347. Mr. Barry.—Who controls the sluice gates?—We control them; we have a man whom we pay to control them in floods; but when the sluice gates are opened the top of the weir for about a foot is clear of water, yet the land is flooded.

5348. Then the sluice gates are not insufficient?—The sluice gates are sufficient, but it is the contraction of the water above the sluice gates that causes the floods.

5349. Have the Board of Works sent anyone to the locality to inquire into the causes of floods?—Yes; we made representations to the Board of Works; but their answer was that we had omitted our duties,

and that there was no money available for any fresh works. They sent an engineer down, but they said they could not interfere.

5350. Mr. Pim.—It was the Board of Works that carried out this drainage, I understand?—Yes; the Board of Works carried it out, and what we complain of is, that the channel of the river is insufficient to carry off the floods. It is quite sufficient in the summer time; but when the floods come the section of the river below Burley bridge is insufficient.

5351. Mr. Barry.—It was sufficient, up to a certain date?—Yes; it was considered to be sufficient.

5352. What has made it insufficient—are other drainage works pouring down water upon you?—There is no doubt the floods are higher latterly than before. I tried to find out the cause of it, whether it was the exceptional rainfall we have had latterly; and I think it must be so, because on the 15th of October we had by my rain-gauge 4.17 inches of rain.

5353. Within what length of time?—In a little over twenty-four hours. We had 4.17 inches of rainfall, and the gauge at the Phoenix Park showed 2.75 inches, showing that there was a greater amount of rain with us than in Dublin.

5354. Mr. Pim.—Was that in October, 1864?—Yes; from the 13th to the 15th of October.

5355. Mr. Barry.—When the other drainage districts were formed above you, did you lodge any objection?—No; we did not know what the effects would be until after they had been completed.

5356. Would you have been heard if you had lodged an objection?—I cannot answer that question; I was a very young man at that time, and my father was alive, and I did not know anything about those matters.

5357. The Chairman.—Have you made representations recently on the subject to the Board of Works?—Yes; and here is an answer I got from them. They say,—"I am desired to state in reply that the Board have no power, under any of the Acts, to carry out the works you suggest." I suggested that the river channel should be increased in width, but the Board of Works replied that they could not do so, "as their powers are confined to putting existing works in order, if neglected by the Trustees, and in this case the Trustees do not appear to have neglected their duties. Under these circumstances the Board do not see that there would be any use in sending an engineer to inspect the district in question." We were accused by certain parties of having neglected our duties. Of course when people are flooded they try to put the blame on whoever is in charge, and I wrote to the Board of Works, and also to Mr. Roberts, asking to have an engineer sent down to inspect the works.

5358. Mr. Barry.—I understand from your evidence that you believe some silt has taken place in the channel of the river?—Yes, but to a very slight extent.

5359. Would that not be one of the matters that you as trustees have to rectify?—I think the silt has been caused by insufficient fall; the fall is only nine inches in two and a half miles in one part of the river.

5360. Still, whatever the cause may be, the silt ought to be removed by the Maintenance Board?—It ought, certainly.

5361. You would be able to raise money for doing that, under your powers?—I think it would be of no use. What we complain of is the water being forced back by the insufficiency of the channel. I think if the river was widened the silt would remove the silt, without despoiling.

5362. Still, if silt has taken place, it must contract the carrying power of the river, must it not?—Well, I think not to any appreciable extent. You asked me whether any silt had taken place, and I said I believed there had, but I think it has been so

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Major Henry  
Cobbold  
Buckingham.

light that it has no effect on the carrying power of the river.

5362. Have you had any levels taken to ascertain to what extent silting has taken place?—No.

5363. Do you think if a greater number of sluices were put in the weir that it would be sufficient?—I think not. The reason I think it would not is that when the sluice gates are open the weir is dry, but the floods still remain above. I think the cause is the insufficiency of the channel above.

5364. Before it arrives at the weir?—Yes.

5365. Mr. Pies.—I understand your case is that this work, which was carried out by the Board of Works, and for which the district paid, does not do what it was intended to do?—Yes, whenever there is a rainfall of more than three inches we have a flooding. There is no flooding where the rainfall is less than three inches. On the occasions of the extraordinary floods we had last year the rainfall was 4.17 and 5.32 inches respectively, and on the 12th and 13th of May the combined fall was 5.32 inches.

5366. The Chairman.—What area of land was flooded in the case you speak of?—The area was about two and a half miles in length by a mile in width at the lower extremity—a sort of triangular space.

5367. I think you suggested that additional embankments should be formed?—Yes, I suggested that embankments should be formed from Townley's stretch to Beggy Bridge, where there is low land.

5368. How high does the water rise there?—About eight feet.

5369. Mr. Barry.—Could you give us the number of acres in the Ardree district?—It is shown on the award. The total is 3,360 acres; that is the area of the lands within one mile of the works. The area of land drained is 3,030. 6s. 11p. statute measure. The increase in value of the land is estimated at £1,751 10s. 4d. The total expenditure was £23,280.

5370. Mr. Pies.—Is the entire charge paid off now?—Yes; it has been paid off for a number of years.

5371. Could you suggest any alteration in the jurisdiction of the Drainage Boards?—No; I am not pre-

pared to offer any suggestion on that subject. I am one of the trustees of the Ardree Drainage, and I think we have done our duty, and the Board of Works say that we have done our duty. We meet every year, and we have got an engineer who looks after every thing that is required.

5372. Do you think it would be desirable to place a large district, not only your district but the drainage of the locality generally, under one central board?—Yes; I think it would be an advantage if the Board of Works had general control.

5373. You would give a general control to the Board of Works?—Yes, I think it would be desirable, for I know the Nether Board do nothing to their district. They are supposed to look after the maintenance of the works in their district, but I know as a fact that they do not. We do maintain our district. We have an annual meeting, and we expend from £110 to £125 or £130 every year in maintenance. The money is expended generally in repairing the banks where necessary, and taking away shoals. The river has been gone over once or twice and the shoals removed, and the banks are periodically pared. We have also to look after some of the drains, which occasionally get choked with weeds, and that occasions some expenditure. We have also a man employed to lift the sluice gates when required.

5374. The people in the district contribute to the expenditure?—Yes; but the bog people, as a rule, pay nothing, and they are the greatest sufferers in times of flood.

5375. You suggest that there should be a general jurisdiction over the river?—Yes, I think so.

5376. Would you suggest that for any works carried out the taxation should be levied upon the whole district?—I think the expense should be levied only on the lands benefited. I think it would not be fair to charge people who receive no benefit.

5377. Suppose the entire lands of a district are improved by the drainage?—In that case they certainly ought to be all made to pay something.

Mr. J. G. T.  
Coddington.

Mr. J. G. T. Coddington called and examined.

5378. The Chairman.—Kindly state your position?—I am a member of the Institute of Civil Engineers, and have been Engineer to the Sack Drainage Board since November, 1885.

5379. You produce a map?—Yes; it is a map of the Sack Drainage District. I have also prepared some notes upon certain points as to which I understand you require information.

5380. Have the kindness to read them?—The length of the river Sack, from its source near Ballinlough to its outfall into the Shannon, is about seventy-six miles. The length of the tributary streams is about 150 miles. The catchment basin has an area of nearly 650 square miles. The outfall of the drainage district is at Pailboy, two and a half miles below Ballinaloe, and six miles above the junction with the Shannon. The catchment basin above Pailboy has an area of 545 square miles, equal to 363,520 statute acres. The main river is divided into four sections by mill weirs erected on the three principal shoals. The slope of country, from the confluence of the Upper Sack and Cloonard river near Castlerose, to the Castlerose weir, is on an average 1.18 feet per mile for twenty-one miles one furlong. The fall at Castlerose is about fifteen feet in one mile one furlong. The second reach to Athleague weir is three and a half miles long, with an average slope of 1.43 feet per mile. The third reach, from Athleague to Ballinaloe, has an average slope of 1.16 feet per mile for thirty-one and a half miles. From Ballinaloe to Pailboy the fall averages 2.2 feet per mile for two and a half miles.

5381. Could you give us the gradient of the river on to the junction from Pailboy?—It is nil. In floods it would be two or three inches per mile, but at present it is nil. I took the levels the other day, which agree with the bench-marks. The character of the river varies very much. In some places it is very wide and deep, with a very sluggish current. The shoals are caused by bars of gravel and limestone boulders, generally seated on ledges of rock. As a rule the shoals are wide and strown with boulders, often cemented together by the lime held in solution by the water. The winter floods rise about three or four feet, and spread over the callows for a great distance. A winter flood is considered good for the land which grows a coarse sort of meadow grass which is cut in the summer. A summer flood coming when the hay is standing or stacked on the low lands is very injurious. The object of the drainage scheme is to hinder the callows being flooded; and the channels were designed to carry off the floods calculated at a volume of 0.8 cubic feet per minute per acre of catchment. The high flood last October had a volume corresponding to 0.625 cubic feet per minute per acre, observed at Pailboy. I beg to produce the gauge diagrams, which exhibit the rainfall daily observed at Ballinaloe, and the height of water below Ballinaloe mill, and they show that heavy rains falling in the summer after a drought have a comparatively slight effect in raising the water surface, whereas a slight shower in the winter, when the land has been saturated by constant wet weather, causes sudden floods. The reason of this is that there are



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very few lakes to provide compensation reservoirs in the area of the catchment basin. The cost of construction of the great shoals was very much under-estimated, and several contractors who had undertaken the work failed. The Engineer then carried out portions of the work by daily labour, which cost a good deal more than the estimated rate. Lastly the work has been let in small contracts after the bed has been unwatered, and has cost 1s. 6d. per cubic yard for gravel, and 3s. for rock, including the cost of unwatering, dams, &c. The amount of the original estimate will consequently be insufficient to complete the works on the original scope, and I have estimated that it would cost £160,475 to provide for floods of 0·6 cubic feet per minute, being an excess of £64,380 over the sanctioned sum of £96,195. The members of the Drainage Board do not contemplate asking for power to increase the outlay on the drainage works, and have directed me to expend the available balance, £66,400 on the best advantage all along the river. I find that with this sum we can only provide for a half flood, i.e., for a volume representing about 0·4 cubic feet per minute per acre of catchment. The cuts will have to be very much restricted in width, and in some places also in depth, but they will be part of the original design, and will admit of the entire scheme being easily carried out should funds be found for the work. In any case, no dredging is impossible, owing to the nature of the shoals, the only way to unwater the shoals is by unwatering them, and this can only be done by stacking one side of the stream, after making a splitting and oress dams, and pumping out the water. Where the shoals have a well defined apex the most economical plan is to calculate the discharge due to the catchment, and to see how much the tightest place must be improved, taking into account that the whole surface of the shoal at the apex or shallowest part can be reduced in height after the side cut is made. This plan reduces the work in the side cuts to a minimum. As the gravel composing the shoals is hard, and will not occur to any appreciable extent, I have designed the surface slopes so as to give a high velocity through the cuttings, and so reduce the cubic content of excavation. In some of the deep water reaches it is found that a slope of 0·2 per mile will suffice, which enables us to concentrate the available fall at the places where the cuts will be made. I have laid down a flood line relieving all the lowest places, and if these low spots can be protected from, say, a half flood, the higher lands will stand a larger one. I propose the working sections, to which I invite your attention. There is no doubt that the limited excavations which are now designed will not guarantee the callows against being flooded in a wet spring or summer, when the hay would be injured, but although we cannot afford to complete the works on the original scope, an additional sum of about £30,000 would enable us to provide against floods of, say, 0·6 cubic feet per minute per acre, or a three quarters flood, and this would, I think, meet the case, as it would ensure the irrigation of the callows in the winter time. Even cuts capable of carrying away floods of 0·8 cubic feet would certainly prove insufficient in exceptionally wet weather, so that it would be imprudent to turn the callows into tilage, or change the nature of the grasses. The area of land proposed to be improved is 19,005 statute acres. In 1846 Mr. Frederick Barry, M.P., prepared a scheme for the Board of Works, which proposed to deal with the whole district of the Suak. The area of the lands to be improved, as taken from his Report, was to be as follows:—Low alluvial land, 37,552 acres; bog to be reclaimed, 35,000 acres; total, 72,552 acres. Mr. FitzGerald valued the annual improvement of these 72,552 acres at £13,547, or about 3s. 8d. per acre per annum.

5382. What is the area of the land to be improved under the modified scheme?—19,005 statute acres.

5383. Is that callow and flooded land?—Low

alluvial land, and also bog, which is at present above the level of the water, but has got no outfall. When the present scheme was prepared in 1877 and 1878, a great deal of flooded land, bordering the tributaries, was excluded, and some of it will only be improved as far as the direct influence of the Suak extends. You will see the land which is to be included is shown by the red marks on the map which I produce.

5384. Mr. Pies.—The land between those marks on the map is to be improved?—Yes, and everything beyond that is excluded. The lands to be charged with the entire cost of the drainage consist of:—Low alluvial lands, 12,515 acres; increased annual value, £4,850, or 7s. 9d. per acre; bog to be reclaimed, 4,490 acres; increased annual value, £217, or 8d. per acre. Total 19,005 acres; annual increased value, £5,067, equal to 6s. 4d. per acre. In the present scheme the whole length of tributaries is only some seventy-five miles:—

		Per Mile.	Cost.
Tributary Rivers.	22 2 6	217	5,070
" Streams.	26 1 6	15	5,265
" Drains.	16 2 2	10	1,640
Total.	74 5 8	242	11,975

I have no doubt that by expending some £20,000 more on the upper reaches of the tributaries, another 20,000 acres would be improved; but, of course, our Act does not give us any power to do this, even if we had the money. I mention this to show that it seems hard that the proprietors of the 19,005 acres, which are nearly all bordering the main river, should have to undertake the main drainage of a much larger district; and it would only be fair if by any means the proprietors of lands whose improvement is rendered easy by the deepening of the outfalls of the tributaries running through those districts should contribute by a general rate to the cost of the works. Since the Royal Commissioners visited Ballinacree I have taken accurate levels of the river from Ballinacree to the Shannon, and I find that owing to Kelly's old-weir and shoal the water is at present held up about two feet three inches. There is another shoal at Correen Ford, where about three and a half inches of water is now held up, but as the Shannon floods come up as far as Poolbeg, there would be not much good in excavating the latter shoal, which is, moreover, beyond our jurisdiction. The October flood of last year, which was the highest recorded in the year, was 122·83 feet above Ordnance datum.

5385. Mr. Barry.—Did you mention in your statement Mr. Frederick Barry's estimate of the cost of the works?—No. It was £177,550 in all; but he considered navigation with it. At the time Mr. Barry framed his estimate labour was cheap.

5386. He estimated £177,550 as the cost of improving bog much land?—72,000 acres.

5387. Your estimate is £160,000 for improving 19,000 acres?—Yes, but it would cost very little to extend it to the tributaries.

5388. Mr. Pies.—I have Mr. Barry's estimate here, and I think there is some mistake in the figures. His estimate for the drainage, independent of the navigation, appears to have been £195,526—Yes, and it was only by combining navigation with the drainage that he made it cheaper.

5389. The cost of the drainage, independent of the navigation would be £195,526—Yes. The cost was diminished by combining navigation with it.

5390. Not because it would cost less, but because by combining navigation with it, he was able to charge somebody else with a portion of the expense?—Yes.

5391. Kelly's weir, which you mentioned just now

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Mr. J. G. F.  
Coddington.

is below your jurisdiction!—It is; we have no control over it.

5392. Does the cul-weir back up the water in time of flood?—It does, very much. At present it is holding up two feet three inches. It would hold up eighteen inches in a flood.

5393. Where is it—how far below Poolboy?—It is about a mile below Poolboy.

5394. Mr. Barry.—What is the nature of the works that you propose to carry out—is it a general deepening through the whole length of the river?—Well, it is not uniform. We do not propose to make the river a uniform depth. In some places the river is already very deep. If we had sufficient money, so that we could make the cuts sufficient to carry off a flood of eight-tenths, I would bring them down to where you see the red line on the section; but as we can only afford to carry away half a flood, it is no use making the channel deeper in one place than another. The cuts, therefore, which were designed to carry off eight-tenths of a flood, I am making only wide enough to carry four-tenths, that is a half flood, but at any future time the other half can be done.

5395. Do you mean deepening or widening—you used the expression "widening" just now?—I meant widening the cuts. We do not require to widen the river, which is from 100 to 300 feet wide.

5396. I see in one part of the river you diminish the width?—Yes, it will be wide enough, and there is no use in having it wider. The channel in that portion of the river is sufficiently spacious to carry off a half flood. I think what I propose is the most economical way of doing it.

5397. Your object is to improve the river by removing shoals, and regulating, as far as you can, the sectional area of the river?—Yes, so far as we can, with the funds at our disposal.

5398. Can you point out where the O'Connor Don's property is on the Suck?—Yes, it is shown on the map. You see that the Suck divides into two at Castlekeogh, and the O'Connor Don's residence is really situated on a tributary, although it is called the Suck.

5399. Has that portion of the river been improved?—Yes, the work is nearly finished; he has left a few bars, so that the floods shall not be allowed to go down and swamp the people below.

5400. What has been the effect of the improvement of that portion of the river upon the people below?—A great many people say there has been an increase in the floods, but certainly some bars have been left of the full height. At the same time it must be remembered that some cul-weirs have been removed all along the river, and that has quickened the speed; and also that if you leave a bar, it must increase the discharge, because the water will jump over it. It has certainly increased the flooding below a little, but not much, because the catchment basin up there is a trifle, being so near the source of the river, so that it can have very little effect on the lands below. They began at the wrong end of the river, certainly.

5401. You would have commenced at a lower reach of the river, and worked upwards?—Yes.

5402. We observed when we were visiting the locality that you were constructing sluices at the bridge at Ballinasloe?—Yes.

5403. Are they in your opinion of sufficient capacity?—Yes. It is to be recollected that the river has two branches at Ballinasloe, and that these sluices are upon only one-half of the river. There are four gates of twenty-five feet in width, and they can be raised seven feet high. I calculate that by raising them five feet they will carry a flood of eight-tenths with a head of two feet six inches, and you could give it a head of three feet six inches if you liked, with the gates raised seven feet.

5404. What amount of money have you in hands now towards the work?—£46,400.

5405. You want £30,000 more?—Yes, I think we

could make it a good job if we had an additional £36,000. The money we have in hand will be only sufficient to carry away four-tenths, but if we had £30,000 more we could carry away three-quarter floods, and I feel confident that, unless in very exceptional seasons, we would be able to guarantee the people against summer flooding, which is the thing wanted. The people, as a rule, like to have the lands covered in the winter. The grass is improved by the land being flooded in the winter, and in fact but for it they would not have the amount of hay in the summer.

5406. The additional £30,000 would enable you to make the cuts wider?—Yes, we would not deepen them much, but we would make them wider.

5407. Mr. Pea.—The total loan granted by Government was £36,000?—Yes, £36,195.

5408. Of which you have still unexpended £45,000?—Yes, we have the sum of £46,400 in hands.

5409. Will you be able to charge the whole £36,195 on the tenants of the lands?—Well, the Board of Works have the power and it will be their duty, as soon as the works are completed, to go down and apportion the drainage charge, according to the benefit derived, apportioning the entire £36,195 over the 19,000 acres benefited.

5410. Do you anticipate the improvement they will be able to calculate upon will be equal to £26,000?—Well, I am afraid there may be some difficulty about that, but of course the lands will have to pay.

5411. The landlords will have to pay?—Yes, the landlords will have to pay it in the first instance.

5412. Do you think the Board of Works will be able to charge the whole £36,195 upon the occupiers of the land in the form of increased rent?—Well, it won't effect so great an improvement as was calculated by Mr. Lyman, when he thought he could carry the whole floods off; but the entire £36,195 will have to be charged against the lands at any rate.

5413. The Chairman.—On what land should the £36,195 be charged; upon the lands flooded and the lands improved?—Yes.

5414. You would spread the expense over the area of land within a certain distance of the works?—Yes, I think it would be only fair to make all lands within, say a mile, contribute to the expense.

5415. That would be a considerable area?—Yes.

5416. About how many acres?—Well, they did not fill up that in the schedule. According to Mr. Frederick Barry's scheme, the lands directly improved amounted to 72,000 acres, but the quantity of land within a mile, belonging to the same proprietors, was 300,000 acres; therefore, if there is the same proportion in our scheme, there would be about 60,000 acres of land within a mile, belonging to the same proprietors.

5417. Are you of opinion that the whole of the lands within the catchment basin should be charged to a small extent—the upper lands, which discharge water on the low lands, and which by improved drainage will discharge more—don't you think they should be made to contribute?—I do. That principle was proposed in India in carrying out irrigation works. The rule proposed was that those who took the water should pay a good deal; those who could take it, but did not, should pay a less rate; and that the whole area benefited and saved from famine by the irrigation should pay something also. It was the same principle, applied in the converse way; but that principle will, I think, never be recognized by the British Parliament.

5418. That does not follow; the principle was actually proposed, and although it was withdrawn, it will be proposed again, I have no doubt. It is impossible that those large sums of money can be expended, if the charge is to be borne by limited areas?—I think the principle is a right one. If the

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drainage of the Sack is improved, of course that of the tributaries will be improved also.

5418. Which do you think would be better value, to expend £30,000 on the drainage of the outlying districts, or upon improving the main stream?—Well, in any case, you would have to expend the £30,000 on the main stream.

5420. Even if you expended the money on the outlying districts, you would have to improve the main stream before you could bring the outlying districts in?—Yes.

5421. What number of acres would you benefit by the plan you propose?—I think you would bring in rather more than 20,000 acres.

5422. What area did Mr. Barry's plan include?—About 70,000, of which 35,000 acres were bog.

5423. That, of course, included the lands affected by the tributaries?—It included lands affected by all the tributaries.

5424. Mr. Barry.—I suppose in your judgment Mr. Frederick Barry's scheme for dealing with the drainage was better than doing it piecemeal?—Yes.

5425. And if the estimates were correct it would have been more remunerative?—Certainly, if it had been carried out at the time, as labour was much cheaper.

5426. But even if some addition was made in consequence of the increased price of labour, would Mr. Barry's scheme, by dealing with the work as a whole, have been more remunerative?—Yes.

5427. Therefore we may take it that his scheme, so far as it dealt with the entire catchment area, commended itself to your judgment?—Yes, leaving out the navigation part.

5428. Did Mr. Barry's scheme deal with a flooding of eight tenths of a cubic foot of water per acre?—I presume it does, but he does not enter into details.

5429. Mr. Pies.—Are there any particulars given of the sectional area?—No; he gives a few notes saying he would make cuts of such and such a width, but no engineering or hydraulic estimates at all.

5430. The *Commissioners*.—Selling the main expense in all these drainage schemes is in the improvement of the main river, and that the quantity of land improved is comparatively limited compared with the expenditure, and that the improvement of the tributaries is a minor cost, as compared with the main scheme, do you think that the larger the area of drainage the more chance there is of it being remunerative?—Certainly.

5431. The whole area should be improved, and the whole catchment basin made to contribute more or less?—Yes, I think so; but we have no Act of Parliament for that.

5432. Have your Commissioners considered the question of reconstituting their district, and taking in the tributaries?—No, I do not think so. Of course they would be glad if the people along the tributaries joined, but they have no power to include them.

5433. Have they taken into consideration the advisability of reconstituting their district, so as to include the tributaries, rather than do the work piecemeal in the way they are now contemplating?—I think the present proprietors would be unwilling to take on themselves any additional responsibility. Their own lands, of course, they are responsible for, but I do not think they would be able to prevail upon their neighbours to join them.

5434. You think the people on the tributaries would refuse to join?—Yes; in fact, they did refuse.

5435. And you think they would still decline to join?—Yes; I do not think that any landowner proprietor would make himself responsible for any expense for improving his land in that way.

5436. Perhaps we might include the tenant now in the term landed proprietor—do you think the tenants of the lands would take sufficient interest in the improvement to support a more perfect scheme?—The

tenants are very anxious that the land should be drained. I know that because several now members of the Drainage Board, who represent the occupiers, are very anxious about it.

5437. You have £10,000 in bank, as it were, to bring into a reconstituted scheme?—Yes.

5438. Supposing that money were brought in, and that the persons interested in the tributaries were invited to join, would it not be better to frame a complete scheme, and not a partial mode of dealing with the water?—Yes, if you could prevail upon them all to join, but I am afraid you would hardly get them to do so. There is a sort of idea prevalent among the people that it is useless, and that the Sack never can be drained.

5439. There is another view of the position of the present subscribers—they are bound to pay the money to the Board of Works, but it is not at all clear that they will get it from the tenants?—That is true. The tenants may object to pay, because it is only a partially finished job.

5440. Therefore from that point of view, also, it might be desirable to consider the matter again in a broad way?—Yes.

5441. If the whole drainage of the Sack and its tributaries were placed under one jurisdiction, would it not be desirable?—Well, there is at present only one Drainage Board; they had another district lately, but they gave it up without any work being done.

5442. Are the tributaries at present under the jurisdiction of any board?—No, with the exception of the Sliven district, which was under a board till some time ago, but it has been wound up.

5443. It is quite obvious your Board would have a jurisdiction, if the tributaries were taken in, which they have not at present?—Yes; we have no power at present to impose any rate upon the tributaries. It would certainly be made for the people along the tributaries to be enabled to drain their lands at the expense of the people along the main river.

5444. They could avoid themselves of the drainage which other people paid for?—Yes, we would provide an outfall for them. There are some mills which would have to be got rid of before they could avail themselves of the outfall; but at present I do not think the proprietors along any of the tributaries would voluntarily undertake the responsibility of paying the cost. I think the reason the Sliven district was given up was because they saw there would be a difficulty about raising the rents in consideration of the proposed improvement.

5445. In fact the proprietors do not take the interest they did formerly in the matter?—Yes, they have not the interest that they formerly had in the improvement of the land. There is no doubt that if the area of the tributaries were made to contribute it would spread the expense over three times the extent of lands, and would therefore reduce the rate to one-third. The estimated charge now is about 7s. 6d. per acre, and the people say that it is a frightful expense, and that they never could afford it. But by bringing in the tributary lands the charge would be reduced to one-half, or about 3s. per acre.

5446. Mr. Barry.—You say that many persons are of opinion that the winter floods do good?—Yes.

5447. Do not others say they are injurious?—Yes, I have heard people say that if the winter floods were taken off, the lands would grow more valuable grass.

5448. Mr. Pies.—It would depend to a great extent upon the manuring properties of the floods?—Yes; but there are not much manuring properties in the floods of the Sack. Owing to the character of the river the floods simply water the land. The people say that the crop of grass depends entirely on having plenty of water on the land in the winter.

5449. Mr. Barry.—It appears to be a vexed question whether the winter floods are beneficial or not?—It is, to some extent.

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5450. When the value of the improvement comes to be assessed, the tenants will have to say whether they see useful or not?—Certainly, but at the preliminary investigation by Mr. Forsyth, many of the occupiers objected to the removal of the winter floods, and said they did not want the irrigation taken away.

5451. But when the value of the improvement effected by the drainage works comes to be assessed, it seems possible that the tenants may say, "If you could do away with the winter floods, we would pay cheerfully, but if you are only going to take away four-tenths of a foot per acre, and leave us exposed to the autumn, spring, and winter floods, the work is not worth paying for." Is not it likely that they may make that objection?—I agree with you.

5452. Don't you think such an objection may be urged?—Yes, and with some justice.

5453. The result would be that the unfortunate landholder would be left to bear the whole expense?—Yes, in fact they all fear that, and on that account the Drainage Board would have liked to wind themselves up and stop, but there was no provision for that in the Act of Parliament, and they were obliged to go on spending the money.

5454. Did it not occur to them that the opportunity might be taken to reconstitute the whole district, and deal with it in a scientific manner?—Certainly, we would be glad to get a grant from the Treasury.

5455. Every one would be glad of that, but the question is whether it would not be worth the consideration of your Board to look at the matter from a new point of view, and deal with the drainage of the entire district as a whole, so as to effect a substantial improvement, and which may result in their getting their money back, whereas they at present stand a chance of losing it all?—No doubt they stand a chance of losing it all, unless the summer floods can be prevented from injuring the hay.

5456. Even if you do keep the summer floods from injuring the hay there seems to be a probability that tenants will say "You have not saved us from the autumn and winter floods, and you must not charge us"?—Well, the Board of Works will deal with that.

5457. You think the Board of Works will put a tax on the tenants?—I think so.

5458. The Chairmen.—Do you see any possibility of carrying out a thorough drainage scheme, limiting the lands to be taxed to those improved by the main drainage?—Not in a drainage of the character of the Suck; it is a very narrow strip of land, and it would cost about eight shillings an acre to make it pay; in fact it would cost more, for if you have to raise another £30,000 it would require ten or eleven shillings an acre, and I do not think it would pay.

5459. Mr. Barry.—Have you considered what effect would result in the Suck, if the floods in the Shannon were reduced?—It would only affect us as far as Ballinacree.

5460. Do you think it would affect you as far up as Ballinacree?—It would, to a certain extent. We have an obstruction below us called Brilly's Ford, and of course the obstruction of the Shannon back-water raises the water with us somewhat, but not much. It renders it not worth while for us to make thorough drainage below Ballinacree, because we are still liable to back-water from the Shannon. If the back-water from the Shannon was taken down 18 inches, we could drain two and a half miles from Ballinacree.

5461. Would the lowering of the back-water from the Shannon, combined with the removal of the ford, enable you to do that?—Yes; the ford belongs to Lord Clonsilla, who is quite alive to the importance of doing away with the obstruction, and making some engine for catching silt at another place, where we are obliged to have an obstruction for a mill. It would certainly help us very much if the Shannon was deepened even to the extent of 18 inches.

5462. Mr. Pea.—Have you calculated the total area of flooded land from the tributaries of the Suck?—I have not, but Mr. F. Barry's report gives the area.

5463. You speak of draining 20,000 acres more, whereas Mr. Barry's scheme contemplated draining 50,000?—If we had an additional £30,000 for tributaries we could improve an additional area of land.

5464. If you got another £20,000 could you drain the portion mentioned in Mr. Barry's scheme?—It would cost £30,000 extra.

5465. The Chairmen.—Do you consider Mr. Barry's estimate of the expense was sufficient?—It is very hard to say. It was made at a time when labour was cheaper than now; it would be insufficient now.

5466. His estimate amounted in round numbers to £200,000?—Yes.

5467. Your grant was £20,000, and you say that an additional £30,000 expended on the main river, and £20,000 on the tributaries, would not do the whole?—I think an additional expenditure of £30,000 on the main river and £20,000 on the tributaries, would provide for summer floods.

5468. To the extent of Mr. Barry's plan?—Yes, as far as the drainage part of it.

5469. That is, for an expenditure of £20,000 on the main river, and £20,000 on the tributaries?—Yes.

5470. That is £20,000, which added to the £20,000 already granted, would be £40,000. You say that for that sum you could carry out a fairly perfect scheme, carrying away eight tenths of a cubic foot per acre within your limits?—Yes, we could do it for £40,000; that is £20,000 extra.

5471. Outside your limits there are the tributaries?—Yes, as I said, I think £30,000 would do the whole of them, making £100,000 in all. Mr. F. Barry's estimate was £100,000.

5472. Although, as you have said, the price of labour now is much greater than in Mr. Barry's time?—Yes, but Mr. Barry intended to make the cuts a good deal wider and deeper, as his scheme was partly intended to serve navigation purposes; while ours includes nothing for that purpose.

5473. So that, allowing for the difference in the cost of labour, your estimate and Mr. Barry's pretty nearly agree?—Yes.

5474. Mr. Pea.—Do you think the channel proposed by Mr. Barry would carry away more water than the channel you propose?—It is hard to answer that, as Mr. Barry does not give any details in his report.

5475. You have calculated the cost of the excavations?—Yes, I am estimating it at so much a cubic yard, that I know it can be done for.

5476. What was the height of the flood last October?—It was 62½ of a cubic foot per acre per minute.

5477. Was that an exceptionally heavy rainfall?—It was.

5477A. Your scheme is intended to carry off a flood equal to that?—Yes.

[The Witness handed in the following estimates].

## SUCK DRAINAGE.

Estimate of Cost of completing the Works with the available funds, £45,400, unexpended of the £96,100 sanctioned.

March 8, 1887.

Mr. J. G. T. Goldington.

Division or Work.	Excavation.	Cost.	Division or Work.	Excavation.	Cost.
Ballymore, . . . . .	C.Y. 11,250	£ 2,250	Clonsilla, . . . . .	C.Y. 8,500	£ 170
Ballygill, . . . . .	25,517	5,103	Blackhawk Main River, . . .	875,035	17,510
Ballymore, . . . . .	25,513	5,103	Trillick and Deane, . . . .	—	8,300
Mount Talbot, . . . . .	21,013	4,203	Cost of Excavation, . . . . .	—	10,510
Rockwood, . . . . .	16,010	3,200	Masonry Walls, . . . . .	—	11,510
Athleague and Castlemore, . .	25,517	5,103			47,510
Dunmore, . . . . .	4,200	840	Contingencies 10 per cent.—Law, Engineers, &c., &c., . . . . .	—	4,310
Lough Dox, . . . . .	44,500	8,900			48,820
Bridge Hill, . . . . .	17,000	3,400			

## SUCK DRAINAGE.

Estimate of Cost of completing the Works on original basis of providing for Floods calculated at 0.6 cubic feet per minute per acre.

Division or Work.	Excavation.	Cost.	Division or Work.	Excavation.	Cost.
Ballymore, . . . . .	140,000	£ 28,000	Excavation, Trillick and Deane, . .	900,000	£ 18,000
Ballygill, . . . . .	54,000	10,800		1,000,000	20,000
Ballymore, . . . . .	60,000	12,000	Masonry Walls, . . . . .	—	15,000
Mount Talbot, . . . . .	21,013	4,203		—	100,000
Rockwood, . . . . .	120,000	24,000	Contingencies, Law, Engineering, &c., 10 per cent., . . . . .	—	16,000
Athleague and Castlemore, . .	134,438	26,888		—	100,000
Dunmore, . . . . .	9,000	1,800	Unexpended balance of sanctioned Estimate, . . . . .	—	45,400
Lough Dox, . . . . .	44,000	8,800	Extra Funds required, . . . . .	—	45,400
Bridge Hill, . . . . .	40,000	8,000	Amount of sanctioned Estimate, . . . . .	25,150	—
Clonsilla, . . . . .	90,000	18,000	Extra Funds required to complete, . . . . .	24,500	—
Excavation, Main River, . . .	720,000	14,400		200,000	—

JOHN GEO. J. COOPER, M. Inst. C.E.

The Commission adjourned.

## THIRTY-FIRST DAY—WEDNESDAY, MARCH 9, 1887.

March 9, 1887.

The Commissioners inspected the River Ban, from Toome to Coleraine, by water, meeting various persons interested in the Local Drainage Question.

## THIRTY-SECOND DAY—THURSDAY, MARCH 10, 1887.

March 10, 1887.

The Commissioners inspected the River Blackwater, in the neighbourhood of Moy, Charlemont, and Blackwater Bridge, and visited the entrance to the Ulster Canal.

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## THIRTY-THIRD DAY—FRIDAY, MARCH 11, 1887,

At 36, MEERON-SQUARE, DUBLIN.

Present—James Abernethy, Esq. (in the Chair); J. Wolfe Barry, Esq., and Joseph T. Finn, Esq.

William Richard LeFauw, Esq., further examined.

March 11, 1887.

Witness:  
William  
Richard  
LeFauw, esq.

5478. Mr. Abernethy.—Will you kindly favour us with the views which you have formed upon certain points we desire to put to you?—The first question is this.—In carrying out drainage schemes hereafter, should the Government undertake the work through a department of its own, as in the case of proceedings under the Drainage Act of 1843?—That will depend on circumstances connected with the districts. If a district is to be assisted by a grant, I think that the works should be carried out by some Government department. If such works were carried out by a Drainage Board, the Board would have no object in hastening the completion of the works, but they would, as has been sometimes done, keep them as long without incurring charge as possible, getting a great deal of the benefit meanwhile, and they would also have no object in using economy in carrying out the works because they would know that they would be indemnified by Government. If, however, the drainage scheme is to be constituted in some manner similar to that in which they are now, without a grant, I think that they ought to be done by means of a Drainage Board representing those who would be charged. If the whole expense of the drainage is to be borne by the persons to be charged, then they ought to be carried out by themselves; but if that is not so, then I think that they ought to be done by a Government department.

5479. Mr. Barry.—If the grant is a limited amount and is only a subscription *pro rata* on the amount for which the owners become liable, would the Drainage Board desire to delay the works because they had a considerable grant?—We find that even now as it is, where they bear the whole charge themselves, they often delay the works in order to postpone their coming under charge.

5480. Why should a limited amount of Government grant, if it were only given *pro rata* on the liability of the district, delay the completion of the works?—Provided you put the whole of the residue of the charge, whatever the cost may be, on the district, I do not think they would have any object in delay more than at present.

5481. If the grant is limited in amount the objection that you raise would not apply with so much force?—Not with so much force, but it would apply. If the occupiers are to be the persons primarily charged with the cost of the works, I think you must charge them on a schedule prepared before the works are commenced, and finally fixed. After that comes anything that Government may do as a help towards the preliminary expenses, and anything that may be contributed for the district at large. I think that what is to be charged must be fixed beforehand. If not, and if they are to bear the whole expense in the way they do now, delay is caused and the works are not completed promptly. Now we have a power to go in and make one award when the total sum is expended for the completion of the works, and to charge the district with the increased expenditure if it has exceeded the original estimate. This is a reason why they are inclined to postpone the award as long as possible. But if you fix beforehand what they are to pay, we cannot impose anything beyond that, and therefore some subsequent grant or some remission or something of that kind must take place.

5482. That is in the event of excess?—In the event of excess.

5483. The second question is—Should loans for

drainage works be made on terms which are easier for the first few years after completion of the works, as being supposed that the full measure of benefit is not immediately attained?—It might be arranged by allowing them, for a limited time, only to pay interest at whatever the rate of interest may be that is fixed, say for the first year or two years. But it must be borne in mind, that in large districts they have opportunities of availing themselves of the benefits offered by the work long before the work is completed. In a large district it will take four or five years to complete the work, and they will have three or four years at the lower part, and two or three higher up, and even at the very top they will have a considerable time during which they derive benefit from the work although it has not been completed, because after the scheme has been practically completed there is a good while allowed before an award is made. They have to settle with contractors to finish the work, and make things perfect all through. In addition to the delays that all that involves they try to put off the award as much as they can. We had an instance of this the other day in the Milford district in Cork, where I held a meeting a year ago to make the award final. They had some dispute with the contractor, and objected that the award should be put off until that had been decided. We were very anxious to bring the matter to a termination. I asked them would they leave the matter in dispute between them and their contractor to arbitration. The contractor was quite willing to accede to this. The engineer and the secretary of the Drainage Board said they were quite willing, and that they would recommend the Drainage Board to do so; but it fell through, for they would not leave it to arbitration. They say now that the contractor may bring any action he likes against them. We were going to hold an award meeting a fortnight hence, but after sending notice of it to the secretary, he writes asking to have us postpone it, as it is in the summer time, and recommending that it be put off till next May. Now, if we postpone it till May we postpone the payment for another half year, for the half-yearly charges become due in April and October.

5484. Mr. Barry.—All this time they will be paying interest?—The interest will be added to the capital. I only give that as an instance of what they would do when it would be their advantage to postpone the final completion of works from which they were deriving benefit. There would be some difficulty in only charging interest for the first few years. I do not think there would be so much difficulty if the persons are charged; but if the occupiers are charged they will take it for granted that the first reduced amount is all they are to pay, and they will be surprised at having to pay a year or two afterwards a much larger sum.

5485. Mr. Abernethy.—Should Government, assuming the system of local Drainage Boards to continue, assist such Boards, either, first, by designating the works itself; or, secondly, by approving the engineer to be employed; or, thirdly, by superintending the execution of the works; or, fourthly, by making the valuation of improvement before instead of after the execution of the works?—You have given four alternatives. The first is, should the Government design the work itself?—I do not think so. I think that if the Drainage Boards are to continue as much responsibility as possible should be thrown on the Drainage Boards.

If there was much interference on the part of the Government, it would be always said that they designed extravagant works, and that they interfered with the Board in carrying them out, and there would be clamour for remission on these grounds. What we want, if Drainage Boards see to carry out works, is, to look more carefully than we have been over able to do into the valuation. From the experience I have had in fixing increased rents, to recoup the landlords to a certain extent for the benefit the tenant derived from the improvement effected, I have found that the valuations have been almost always too high—generally I think, an average of 5s. 8d. an acre. I think an average of 5s. an acre is about as much as you could rely on the tenants to pay. Hitherto we had very full powers, for the inspectors were appointed before the district was formed, and authorised to make inquiries and hear objections to the project when the plans of the promoters were lodged; but we have found very great difficulty in getting drainage promoters to lodge a sufficient sum. They beg us to let them off with as small a sum as possible to cover the expense of an inquiry, which is chiefly to hear objections. We have, however, to go through the whole scheme, but it would be in vain for us to ask for a sufficient sum for the purpose of the valuation of every farm. I think we ought to be able to appoint—perhaps in addition to our engineers, who would look at the estimate—to appoint a really competent valuator to see that the valuation is fair and right, so that the project might be put forward fairly and rightly before the promoters are required to assent to it. Of course the natural tendency is to increase the estimated improved value, and in many cases the increase in the charge to the district is in consequence of the valuator having taken too high a value. I think that in many cases of this kind, the excess was due both to the valuator and the engineer. Of course the tendency in any man anxious to get up a project is, to make the estimate low and the valuation high, so as to show that it would be a paying scheme. I think that we ought to try to counteract that, and to put only really fair and reasonable schemes before the people. In carrying out that view I think we could not get them to lodge sufficient money, and I think that that is where the Government might be expected to come in and allow us to make full inquiry, which would not be very expensive. I do not think we would ever get money enough from the promoters to make the preliminary inquiry sufficiently accurate.

5485. Mr. Barry.—Would you extend that inquiry to the completeness and efficiency of the plan as well as to the details?—Yes, I think it should have that extent.

5486. That criticism of the plan, in your view, would be left to some Government engineer?—It would, but unless there was something serious in it to object to they should not interfere much.

5487. Do you think that under the present system there is a tendency rather to avoid spending money in the preliminary investigation of plans, that is spending a sufficient sum of money to thoroughly investigate and make the necessary inquiries regarding a scheme?—I think they get up the plans as well as the engineer is capable of getting them up. I believe the system is that he does it on speculation, that if the scheme goes on he is paid, and if it does not go on he is paid only some small sum, or not paid at all. I cannot say that positively, but I think that is the system that is going on very much.

5488. Take a large scheme such as the improvement of the River Barrow. The preparation of plans, so that a trustworthy estimate, not only of money, but of the results to be gained by the execution of the plans, is a very expensive affair, involving probably some hundreds, or even thousands, of pounds to go thoroughly through a well considered scheme. The outlay involved in such a scheme falls at present, I believe, on the engineer promoting it, with such assistance as he could get by subscriptions?—Yes.

5489. Do you think that that is a system which rather tends—I do not want to use the word efficiently—to “scamp” his plan?—In a large scheme like that of the Barrow, in which the expense of preparing adequate plans must be very large, the plans ought to be prepared by a Government department. I do not think that these very large schemes can be carried out as they ought to be by a local board. After they have been completed they ought to be handed over to a local board representing the district, and charged with their future maintenance. But I think that a very large scheme such as that should certainly be carried out by some Government department.

5490. In such schemes must not the initiatory expenses be heavy?—They would be heavy necessarily, because if the occupiers are to be charged you must be very careful in your valuation, and must try and look at every farm and see every bit of it. You may put a valuation on a gentleman's property and afterwards divide it amongst the tenants, as we do now, to the extent of what we think they are benefited. But if you are to charge the tenants directly you must have your valuations very correct and accurate indeed. If the charge is not fixed beforehand, and there is an excess afterwards, as there has almost always been, in the estimates, especially in large schemes, the Government would have to come in with a supplementary grant or a remission.

5491. Do you think that the Government is less likely to exceed their estimates than local boards are?—I think so. With the experience we have now—days the same difficulties would not arise as those which occurred under the 5 and 6 Victoria, where the works were done as isolated works, and numbers of circumstances occurred that made them more costly than they would otherwise have been. I would not say that the estimates ought never to be exceeded. You must not make an excessive estimate, because then they would say the Government is stopping the scheme by putting in an absurd estimate.

5492. Mr. Abernethy.—By the Government taking up the preliminary investigation it would, in your opinion, be a more complete scheme?—It would be a more complete scheme.

5493. And less liable to the estimate being afterwards exceeded?—Yes.

5494. I think you have already answered the fourth branch of the question we are now dealing with, as to making the valuation of improvements before, instead of after the execution of the works?—Yes, I think that the valuation should be made before, and the charge made on that valuation instead of being determined afterwards. I think that the occupier should assent to it, and that it should be binding upon all. By the present system we must put the whole charge, whatever it costs, on the proprietors. When I hold an award a man says, “My land is not benefited to the extent of what is in your award.” I say, “Unless you can show me that the charge on you is relatively higher than it is on the other proprietors I cannot alter it. I cannot take the charge off you, and put it on others who may be in the same way as you, although they have not come here.” I think you must put the entire cost on the lands. In every way it is desirable that the charge, whether upon the occupiers who pay the larger portion, or upon the districts at large, if they are to be charged as is suggested now, or on some towns, the charges should be all fixed beforehand, and unchangeably fixed.

5495. Mr. Finn.—Then who is to bear the risk of the excess of outlay beyond the original estimate?—That is what I say, that if that is the case Government will have to pay it. I will show you afterwards matter in relation to another question, that that would not follow in the smaller districts in which there would be always a margin of probably thirty-five per cent, sufficient to cover anything that may occur in the estimate, still leaving the charge on the lands less than

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the benefit. In the large districts there would be no margin but an excess.

5497. Mr. Barry.—Assuming there was this decrease of thirty-five per cent., what would become of it if it were not required?—They would not pay the rate originally fixed.

5498. Mr. Abernethy.—You say there is a margin?—What I mean is this—did they cost as much as the districts heretofore under the Act of 1863—if they were extended as much as in those cases, even then the occupiers would not be losers, they would be gainers by paying the charge; the benefit would be more than the charge on them.

5499. Mr. Pies.—Supposing that the cost is less than the original estimate, you say that there is a margin of thirty or thirty-five per cent. on small schemes?—On the small schemes under £5,000, the average return per cent., according to the former estimate, was £6 14s. 6d. Say the charge was £5 per cent.; it would be repaid in 35 years, but if you extend the time to forty years it would be £4 13s. 8d. at three and a half per cent. interest; it would be £4 10s. 1d. at three and a quarter per cent., leaving a large margin between it and £6 14s. 6d.; and in these smaller districts the valuation we have found to be higher whatever the cause is. There is a great deal more of bog and unproductive land in the large than in the small districts. If the payment is only £4 10s., there would be a considerable margin between that and £6 14s. 6d.

5500. Mr. Barry.—In the event of that margin not being required, would the tax run itself out earlier?—No, but it would be more paying if under the estimate. In fact, the small districts are paying districts now under £5 per cent. on the cost.

5501. Mr. Pies.—You propose that in the first instance, before requiring any funds from the people whose lands are proposed to be benefited, you would have their lands valued and distinctly state to them what the future charge would be, and if they agree to go on with it you would go further. But you said you would have the charge fixed?—Yes.

5502. Now, supposing the scheme cost less than that fixed charge when carried out, a proportionate reduction would take place according to the amount it was less than the valuation?—Yes; not less than the estimate.

5503. I mean that the interest on the sinking fund and valuation would be less?—Yes; so I think, and it always ought.

5504. Then, would you propose to reduce the charge year rates in that case, or what would you do with the surplus revenue?—There would be no surplus revenue. Our charge would only repay our loan. The charge would barely repay the cost. If you mean that it was done for less than the estimate, I do not contemplate that as a possibility. I think the danger is that the estimate will be exceeded.

5505. We will take it the other way. Who is to pay the excess?—The scheme would not go on.

5506. When you have got the tenders in and find an excess?—The scheme would not go on at all if our estimate did not show a sufficient return.

5507. We are assuming that you ask for the assent of the occupiers to a fixed charge before you have taken the tenders?—Before that, but not before the estimate is made. They will have a very detailed estimate before them at the same time.

5508. You make a contract after having made your estimate. Sometimes accidents take place. Supposing you have an agreement for the performance of a work for £6,000, and that it afterwards cost £7,000, who is to pay the £1,000 difference?—It would be charged. The occupiers would, in those small districts, be charged with it. They will be charged the value of the improvement.

5509. But if it was a definite fixed sum in advance, how could they be afterwards charged a higher rate?—Suppose the valuation was £5; they could not be charged more than the valuation, but they might be

charged less. What I mean is this—we will take one of the small districts; they showed an average return of 26 odd per cent.; their charge in repayment of the loan was 5 per cent. on the cost. If the cost was exceeded even a little more, still they would have a benefit by paying the charge on the whole cost. They consent to be charged with £6 10s. or £6, or whatever it may be. The charge on them, even if the estimate is exceeded, will not amount to that.

5510. Mr. Barry.—Supposing the fixed charge for a certain benefit is £5 an acre, and the estimate when it comes to justify the assumption that the money required will necessitate a charge of £5 per acre?—I quite follow that.

5511. And supposing that during the progress of the work some accident happens, or some miscalculation has occurred, and an excess of expenditure necessarily takes place beyond the estimate, where is the money to come from to find that excess over the original £5, which was a fixed and unchangeable sum?—As I said, in the smaller districts the benefit would be more, a great deal, than the cost. Of course if it comes to what you said, that the benefit is £5 and the charge more than £5, it is an excess then, and it must be met from somewhere.

5512. But then if you have an unalterable sum what is the advantage of it?—You must have an unalterable sum to be charged on the occupiers, and charge the excess over the district rateably, or by means of a grant.

5513. Do you mean over the whole district?—Over the whole district.

5514. That is one of the considerations which have to be borne in mind when we come to the question of rating the whole district?—Yes. In the small districts I do not think it would arise; I think they have all been paying districts; the benefit received was more than the charge, and for that reason there are some small districts being got up still.

5515. Supposing you make a fixed permanent charge of £5 per acre, and when the final estimate comes in you find that the expenditure would only amount to £4 10s. per acre, leaving a balance to the good of 10s. per acre, what would become of that 10s. per acre if the charge is a fixed one of £5 per acre?—That would have to be provided for. Suppose we only spent £100,000 instead of £120,000 they would only pay £5 on the £100,000.

5516. Then the charge would not be a fixed sum?—It would not be fixed absolutely; but it would be fixed that they should be charged no more.

5517. That is what I thought you meant, that it should not exceed that sum?—That it should not exceed the maximum charge, but in the smaller districts it might be less.

5518. Mr. Abernethy.—If the valuation is to be made before instead of after the execution of the works the preliminary inquiry should be of the most perfect character?—I think so.

5519. Will you now tell us what proportion of amounts should be required to start a district, and should those amounts be general to the scheme as a whole, or specific to the imposition of a certain charge on the holding?—I think that they should be specific to the imposition of a certain charge on the holding and not general. I do not think that general amounts would be of any use. If it was determined that any Government department should carry out the projects I think the preliminary expense on the proprietors might be very small. If they were to bring a scheme forward for the consideration of Government a very moderate expense would be sufficient for that. They would have to give Ordnance maps showing the boundary of the flooded and injured lands and a section of the river; and they should also distinguish bog lands from others. The charge upon bog lands must be a more trifle if anything. They very often put charges on them in those estimates that are not realized at all. When the Government department is supplied



with those documents they could easily judge whether prices, &c. it would be a paying district. If you put five shillings on acre as a rough thing over the whole injured lands, including bogs, you would find what the return would be, and from the section of the river you could make a rough estimate of the cost. Then you might get general assents upon that—assents of persons representing one-third or one-fourth; and the Government might then begin the survey.

5520. Mr. Barry.—Would you not also want to know the drainage area?—Yes; we could ascertain that ourselves; we have it on the Ordnance maps.

5521. Mr. Abernethy.—At present the bogs are charged?—I do not charge bog land which has been distinguished as such.

5522. There is a charge at present?—It has been small; bog lands were put in sometimes. Very often where the proprietor calls on us to put a charge on his tenants for bog land, we have been unable to do so.

5523. Mr. Barry.—We have seen cases where bogs have been cut down to the level of the water and could not be cut any lower?—Yes.

5524. If the water level be lowered two or three feet would not that be found a benefit to the owners of such bogs?—There are very few of that class of cases.

5525. We saw several such cases yesterday in Arragh?—There may have been some there, but in general there is a great deal of red bog not cut away. They have been able to cut them as low as they wished. They take the stuff that is too wet to cut into sods and it is spread out in a layer of about seven inches deep, and it is left to consolidate slightly, and with their hands they shape the sides and end of each sod and it is then let dry by being put standing on end in little districts for a time, and that is the turf that they like best; it is the most lasting turf but not bright burning turf.

5526. Mr. Abernethy.—The next question is—How should the rentcharge in repayment of a drainage loan be assessed?—As I have said, I think that it should be assessed on the occupiers and not on the proprietors.

5527. Mr. Barry.—Would you say that the proprietors should be entirely absolved?—I think the proprietors will not be benefited now at all since the Land Act. I cannot see what they can gain by it. Of course they would be occupiers of the lands in their own hands.

5528. Assuming that the rent is fixed for seventeen years and the tax on the land is agreed over thirty years, at the end of the seventeen years does not the owner of the land have some interest, pro or con, resulting from the drainage?—The tax would be over thirty-five years at the least. I think that any revenue he would have at the end of thirty-five years very small.

5529. Mr. Pies.—Mr. Barry is speaking of tenants' statutory leases?—He would have some interest if men had taken advantage of the drainage in the meantime, which they do not to a very large extent, and I doubt that they will in a great many instances. Of course if they have, and if the land appears to the Land Commissioners to be of greater value than it was, they may take it into consideration.

5530. Mr. Abernethy.—Do you find that when the main drains are cut by boards the tenants avail themselves of them, and make cross drains?—They do so, but not much. I do not think the Land Commissioners would put any value on the main drains. In some instances, if they do not cultivate the land, it looks worse after the drainage has been effected than it did before. Low moory lands, especially, when the water is taken off look worse. At all the inquiries I hold the witnesses say it not only looks worse, but it is worse.

5531. Mr. Pies.—Is there not a risk that at the end of fifteen years the landlord's rent might be reduced on the plea that the drainage had not been effectively carried out?—Certainly.

5532. Mr. Barry.—In view of the recommendations,

of the late Land Commission, where, I believe, the idea is to reassess the land every five years, would not that circumstance or any circumstances of that sort give the landlord a most distinct interest in the consideration of a scheme of drainage?—If a man thought his land was going to be reassessed three years hence, he would want to get his rent reduced, and so might not take advantage of the drainage.

5533. Therefore the landlord is interested?—He is interested, no doubt, to a small extent.

5534. Would you think that, looking at the position of the landlord, he should have some voice in the consideration of a drainage scheme, in the first instance?—Yes.

5535. You would not have that voice or power to exercise a veto at too high a figure?—Quite so.

5536. Mr. Abernethy.—There is a further branch of this question as to how the assessment should be collected, whether by the maintenance board, the county cess collectors, the poor rate collectors, or by the Board of Works direct, as now?—I think our board could collect the rentcharge, with a little addition to our staff, not a very material addition. We could collect the rentcharge from the occupiers. At present, taking all our loans, the collections we have to make are about 23,000 in the year—20,000 without the land improvement loans.

5537. Mr. Pies.—Do you mean 23,000 persons or so many accounts?—I mean different accounts. You may take as an average an occupier to every fifteen acres of improved land. I went through several districts and found them very considerably, but that seemed to be about the average. If as many schemes were carried out as have been carried out under the Act of '63, it would add about 5,000 occupiers, so that it would not so largely increase the staff necessary, and of course those 5,000 would not come in for many years.

5538. Mr. Barry.—What amount of money do the 23,000 collections involve?—I could not tell you that at this moment. You will find that in our annual report. It is a very large sum.

5539. What proportion of the 23,000 are under the Drainage Acts, and what proportion refer to other Acts?—I think there are about 5,000 tenants who have borrowed for improvements.

5540. Would the rest be under the Drainage Acts?—The charges include landowners, all the drainage schemes, loans for harbours and railways, loans to municipal bodies, sanitary loans, and every kind of public works.

5541. How are they collected?—In recovering these small amounts, we send a circular to every man telling him his instalment to do, and if he does not pay within a certain day, penalties are added, and if it be not paid before a certain time, proceedings are taken. We have got authority under some Acts to issue a certificate signed by one of our Commissioners, which merely states that so and so is due, and that is sufficient proof before the assistant collector or magistrate that that amount is due.

5542. Mr. Pies.—Where does he make the payment?—We send him a receivable order and he passes it to us through a bank.

5543. By lodging the amount in any of the local banks?—Yes, we send him a receivable order to lodge in any local bank.

5544. Mr. Barry.—Do you often have to proceed for repayment?—We have a good many cases under the Reproductive Loans Fund Act, and we now shall have a good many against proprietors for the rentcharges under the Drainage and Land Improvement Acts, as there are a great many of them in arrears now. They say, how can we pay for drainage works when we get no rents.

5545. Have you any suggestion to make as to the mode of collection?—I think that if there is a rentcharge over a district at large, whether it is fixed beforehand or whether it is to cover the works in excess, that that ought to be collected as the county

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cess, but that our Board could quite well collect from the occupiers, with some addition to our staff, the charge for direct benefit to their land.

5547. You mean that your Board would collect the charge on lands benefited and that the county cess collector should collect from the acre at large?—Yes.

5548. Mr. Alcock.—Should the final conferring authority for a Drainage Scheme be Parliament, as now, or the Privy Council of Ireland?—I would say the Privy Council, for many reasons; one is that there is sometimes considerable delay involved in applying to Parliament. Unless we send in a Bill, I think before 28th May is the day, when we must send a Bill to the Treasury or it cannot be passed that session; therefore from May till the following February a case lies dormant. The different requirements of the Act may have enabled us to make a provisional order in the end of May. We cannot then do anything towards obtaining an Act till Parliament meets in February. There are certain days fixed in the House before which Bills must be read. The Treasury have told us that they cannot bring in any Bill unless it is lodged with them before the 28th May.

5549. Mr. Barry.—How long does it take after it goes to the Treasury?—It takes little time, and we never have had opposition to a Bill. If people want to appear and give evidence it is much easier to give evidence before the Privy Council than to go to London and stand before a Parliamentary Committee.

5550. Do the Privy Council sit from time to time?—They do, except in the long vacation, two months in summer. I think that as a rule they sit from time to time all the year round. I think they should have power to give compulsory powers for purchase of land as they have in the Tramways Act. They have the same power as Parliament to give compulsory powers under the Tramways Act of 1883. The Provisional Order that we make lies on the table of the House of Commons for a certain number of days and has never been opposed. The Privy Council would afford greater facilities to persons who might have objections to make.

5551. There is a clause in the English Act which forbids promoters from taking part of a property without taking the whole?—I know—the case of cutting a small piece off a field or a house.

5552. Yes. Does the Privy Council, under the Tramways Act, ever grant abolition from the pressure of that clause?—I could not answer that at this moment. I think they have nearly all the powers as to compulsory purchase that Parliament has. The lands that we intended to be purchased must be exhibited in the plans laid before them, just as they are in Parliament.

5553. Mr. Finn.—Is it your suggestion that the Board of Works should grant a provisional order very much in the same way as under the present system, and that it should be confirmed by the Privy Council?

—Yes. Of course that would not apply to any scheme carried out by a public department; there should be, I suppose, some new special legislation for that.

5554. Mr. Barry.—You mean that works carried out by public departments would not be in the same position?—I think not. Formerly there were no special Acts for the drainage works carried out for each separate district, but one general Act, by which the Board of Works carried out those. Under the 5th and 27 Victoria, cap. 88, each Order has to be confirmed by Parliament. If a public board carried them out they should do so without going to the Privy Council.

5555. Mr. Finn.—Your powers under the old Act have lapsed?—A great many of them are incorporated, or connected with other Acts—the Drainage of Land Acts, and a great many other Acts. The 5th and 27 Victoria, cap. 88, gives us various powers.

5556. You cannot initiate a new scheme now under the old Act?—No.

5557. Mr. Alcock.—We come now to this very important question—what improvements are needed

in the law under which mills are dealt with?—I think we should have the same compulsory power of dealing with mills as we have with respect to any other property, compulsory powers of purchase.

5558. Do you think it absolutely necessary to have compulsory power to purchase the mills—could it not be so arranged that they would be compensated in some way?—I think there ought to be compensation in the way that it has been done hitherto, by altering the wheels of mills and so on; but where it was really desirable and necessary, it would be of great importance to the drainage I think, that there should be power of compulsory purchase.

5559. But if not absolutely necessary why should it be wished for?—A mill might be altered to suit the new drainage works.

5560. Mr. Barry.—And therefore to that extent the 52nd Section of the Act I was talking of, would have to be set aside in particular cases?—It would.

5561. I dare say you must be aware that the 52nd Section of the Land Clauses Act is sometimes set aside in particular properties, which are specially scheduled to the Act?—Yes, that could be done with regard to any improvement of mills that may be deemed desirable.

5562. And that you would do in your application to the Privy Council?—Yes, in our Provisional Order. We would inquire into what ought to be done with the various mills. I think what has enhanced the compensation for four mills, and properties of such a kind is going before juries. A jury will give always, as against a public Board, as heavy damages as they honestly can. I think that still more so that would be the case if there was Government assistance. Except in those special cases that might be excepted in the Act, it should be settled what was to be paid by an Arbitrator appointed by the Board of Works, with an appeal to the County Court Judges, without a jury. The County Court Judge now fixes the rates of tenants absolutely without a jury. In that case I think there is an appeal from him to the Land Commission. Of course I do not know whether the Land Commission would be inclined to undertake any duty in connection with this matter, which is not directly connected with their province; but it would be a very good Court of Appeal—they have their valuers.

5563. But why should there be a Court of Appeal from a skilled arbitrator?—If the Government give any assistance, I think the Government should not appoint the man who is to fix the value.

5564. I dare say you are aware that very important cases are dealt with in England by a single umpire who is appointed by arbitrators chosen by both sides. Those two gentlemen appoint an umpire whose decision is final?—In old days I was very often appointed by the Board of Trade, sometimes as arbitrator, and sometimes as umpire.

5565. Why should you have an appeal?—It would be the best thing if it could be done by arbitration without appeal.

5566. If Government appoint an arbitrator I can see why his decision should not be final, but assuming that both sides appoint arbitrators, and these afterwards select an umpire, I do not see why that umpire should not have a final voice. Does any reason against it occur to you?—I think it would be rather an expensive process. I know myself arbitrations that were very expensive. I think an appeal would be better. If, as under the 5th and 27th Victoria, a public department is to carry a work out, they should prepare a schedule of compensations, hold a court, and hear objections to their compensation, and there should be an appeal from them to the County Court Judge, without a jury, looking to the power that he has now.

5567. Mr. Finn.—Have you under your old Act, as Board of Works, or have Drainage Boards, under the present Act, compulsory power to make alteration in a mill, and give compensation for it?—Yes.

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5560. Mr. Abernethy.—What is your opinion on the question of maintenance? Should there be more Government superintendence than now, by Government being represented on the Maintenance Board, or by having inspectors reporting periodically, or by increased facilities for aggrieved individuals to set the Government on motion, or by increased power of interference of its own motion, or by right of veto on the appointment of engineer to the Maintenance Board?—I think we have sufficient power under the Drainage Maintenance Act for keeping districts in order; but the 19th section of the Act is hardly ever applied. It is a section which enables us, upon finding that a district is out of order, to call on the trustees, of our own motion, to do whatever may be necessary—to go in and compel the trustees or Drainage Board to put the drainage scheme in order, and failing their doing it we have power to go in and do it ourselves, making a charge. That 19th section has been very little worked, for the simple reason that we have not a staff of engineers sufficient to enter into such an inquiry. Our staff is so completely taken up that we are not able to make periodical inspections. We should have some small addition—one or two—to our engineering staff, to make periodical inspection of drainage districts, and to report whether they are kept in order. We have sufficient power if we had sufficient staff.

5561. Mr. Barry.—Where do the funds come from for maintenance? supposing you find that you want to spend a couple of thousand pounds on the maintenance of a river?—We apply to the Treasury for a loan for that amount, and then charge it on the districts.

5562. On the rated lands?—On the rated lands. If it is their neglect it is quite right that they should be charged and made pay for their neglect, so we do not spread it over any large number of years. If you spread it over a large number of years and made it very light to them it would be rather an inducement to let districts go into disrepair.

5563. Mr. Abernethy.—Do you think it necessary to have an addition to your staff?—Yes, probably two inspectors. Our powers I think are sufficient.

5570. Should there be simpler means of punishing people for neglect of or injury to drainage works?—I think we have sufficient power to prevent neglect and injury. The 71st section of the 24 & 27 Victoria, cap. 88, imposes a penalty not exceeding £10 for injuring or allowing to be injured drainage works, and forty shillings a day for every day that the injury is permitted to continue. The 23rd section of the Maintenance Act, the 29 & 30 Victoria, cap. 49, imposes a penalty not exceeding £10 on any one who in any way allows the work to be injured. That section was put in in consequence of complaints that the magistrates did not know how to deal with cases where cattle came to the banks and trod them down and sent parts of them into the course. I think that is enough.

5571. On the question of embankment, supposing a person cut through a bank and flooded a large district of the country, do you think that £10 would be a sufficient penalty?—The penalty in title 5 & 6

Victoria is much greater, and our solicitor is of opinion that it is in force still. The 24th section of the Drainage Maintenance Act says that Act is to be read with the 5 & 6 Victoria, and his opinion is that it enables us to exercise all the powers given to us under that Act in relation to injury. The penalty for cutting a bank or injury of that kind under the 13th section of the 5 & 6 Victoria is transportation beyond the seas for seven years, or two years imprisonment, and there are very heavy penalties in the 180th to the 135th section of that Act.

5572. Mr. Barry.—How are those £10 fines recoverable?—By the magistrates. They could give a warrant at petty sessions to seize the man's cattle. The Secretary of the Drainage Board would process, and it would be a very summary proceeding before the magistrates. It has been exercised many times.

5573. Mr. Abernethy.—Have you anything further to add?—I have prepared figures to show you how drainage projects have fallen off since 1831. There were fourteen drainage districts formed between January, 1875, and August, 1881, which have been or are being carried out. The area of land to be improved was 37,442 acres, at an estimated cost of £410,338. Since the Land Act of 1881, twelve drainage districts have been formed, and the area of improved land is 19,070 acres, at against 37,442 acres in the period preceding, and the cost is £268,880, as against £410,338.

5574. Mr. Barry.—You could not give us, I suppose, a table showing that year by year?—We could make it out; this is only a summary.

5575. Mr. Abernethy.—How do you account for such a diminished estimate?—The lands are diminished proportionally. During the last year we have only brought forward four very small districts—Fallsdown in Meeth, Ballycolleton in Tipperary, Tramore in Cork, and Killard in Cork. The whole area of those four districts was only 284 acres, and the estimate £4,430; so I think that unless something is done that we shall have only very small districts brought forward where either the land is in the hands of proprietors, or they have been able to arrange with the few tenants in their district to agree with them in getting the district done.

5576. Mr. Barry.—Do you think the drainage has been regular from 1851?—I think it has—pretty regular.

5577. The returns, I suppose, do not show any signs of recovery?—No; rather the reverse, I think, because the more the landlords have experienced that they have to pay the charge, and that we are not able to put any considerable charge on the tenants, and there is almost always some loss, they are, of course, the more unwilling to get up projects. I have here a memorandum of the annual rentcharges to pay for loans at different periods, 25, 40, 45, and 49 years at different rates of interest. This is a comparative table showing the results produced, assuming an average of 5s. per acre was spent to improve the value of lands; giving the return on the outlay, and also the rentcharges at 2½, 3½ and the other rates per cent.

(Documents handed in.)

Mr. Christopher Mafoney, c n, examined.

5578. Mr. Abernethy.—What is your position?—I am engineer to the Grand Canal Company.

5579. You are well acquainted with the Lower Barrow, and the state of the navigation there?—The navigation—part of it. I examined the whole of it in 1855, from end to end, and I have been in a few places on the river since then, but not over the whole of it.

5580. Can you specify the sections of the river that you have been over?—Yes, I have been at Ardree below Athy, and at Dunbrin, and at Tinsbridge Canal below Greigsmacnaght. I passed by Maginny once, but not for the Barrow Company. I have been at Carlow. I do not think I have been at any other places since 1855.

5581. Did you examine the condition of the river  
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 Mafoney, c n.

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Mr. Christy,  
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carefully at these points that you have named subsequently—Schuonagh to 1863.

1863. Yes—I did, at Ardree particularly.

1863. Will you give us an account of what you found to be the condition of the navigation of those places?—Yes.

1864. Mr. Pitt.—On whose behalf did you examine the river in 1863?—On behalf of the Barrow Navigation Company.

1865. Were you engineer of the Grand Canal Company at that time?—Yes; the chairman was the late Mr. William Digges La Touche, who was a leading director of the Barrow Navigation Board. It was at his instance I examined it. (Producer map.) This is a portion of the river near the town of Athy. Athy would be up the river, one mile from Ardree lock.

1866. Mr. Barry.—When was this plan made?—In 1862. There were complaints made of want of water in the reaches of the river at particular places. The boats trading for the Grand Canal Company could not carry full cargoes, and loss of freight occurred, probably on ten or fifteen tons. This state of affairs got to be spoken of a good deal, and at last Mr. La Touche said to me, "You had better go down and examine that part of the river, and let us know something about it."—I will mention it to the Barrow Board"—meaning that he had directed me for the Barrow Board to do it. I went down accordingly and examined the river. The first sounding here, near the mill, at the part coloured red shows where the dredging was required. The part from the mill on to the lock could be unwatered, and labourers could be put on there to excavate the gravel.

1867. Mr. Abernethy.—What condition did you find that particular part in 1863?—It was pretty much the same as what I found in 1862.

1868. Have you anything showing what the state of things was?—I have soundings on the six-inch Ordnance maps of the whole river. It was pretty much the same thing after wards. If you like I will read my report of these particular places.

1869. Yes—I took in my report three sections of the river. It is in the first section that Athy occurs. My report states—on arriving at Athy my attention was very closely drawn to the state of the river and canal between that town and the Ardree lock.

1870. Mr. Pitt.—Was that report made in 1863?—No, in 1863. I stated—"One of your boats, number 624, laden with coal was delayed at the tail of the 28th lock, Grand Canal, and the crew were engaged in transhipping part of her cargo into boat 419 for want of sufficient water in that part of the canal close to Ardree mill. The mill was then at work and while the depth of water on the upper side of Ardree lock was four feet eight and a half inches, the depth in the canal immediately above the drawbridge at the mill varied from three feet nine to three feet eleven inches, for about 200 feet in length, as well as I could ascertain. The mill of the mill sluice is not more than three feet above the level of the upper sill of the lock and the water flows unimpeded from the canal into the mill sluice. Hence, one of the causes of this part of the navigation being impoverished in dry weather. I had a practical proof of the effect this mill has on the canal in dry weather. On the 17th ultimo another of your boats caught the ground close to the mill; the mill sluice was closed, and in the space of sixteen minutes the water increased seven inches in depth, and the boat was hauled off easily."

1871. Mr. Abernethy.—You have got here on your plan a note, August 17th, 1862, depth 4·6 feet. There was a greater depth in 1863 than in 1862. The water was higher. The sill of the lock is a fixed point. That was the state of it then. I have a report on, viz., that which I had better read for you.

1862. Have you anything showing the difference of the surface of the water in 1863 as compared with 1862?—Only as taking the heights on the sill of the lock. The water will vary constantly.

1863. There was more water in the river, in fact, at the time?—Yes; I will read the report appertaining to that particular sill. This report refers to this place. It is dated 15th November, 1862, and it states—"On the 11th September last I received an order, directing me to visit Ardree and Dunbrin, and report what should be done as to dredging. On the 21st September, I took soundings in the canal at Ardree mill, and also in the river at Dunbrin and Farnhill. The soundings are recorded along this line on the plan [Witness points them out]. On this occasion I had a three-quarter-inch iron bar driven fifteen inches into the bed of the canal at the mill, and also at the shoal at Dunbrin and Farnhill. On the 5th October, I took soundings across the river at Dunbrin and Farnhill, and had a heavy bar driven into the shoal at this place." It was stated that the shoals could not be dredged. "It also was driven fifteen inches. The shoals consist of gravel closely connected on the surface with sand. The measurements I made and the soundings taken have enabled me to make the accompanying map and sections which will show the position of the shoals and the depths of water on them on the 21st September last. The depth of water on the upper sill at Ardree lock on that day was 4 feet 10 inches, and on the lower sill 6 feet. The depths in the navigable cut at Ardree mill varied from 3 feet 3 inches to 5 feet 2 inches, and 4 feet 2 inches at the drawbridge. What I said it was in 1863. "This shoal extends north of the mill yard about 120 feet. The depths at Dunbrin varied from 3 feet 11 inches to 4 feet 4 inches, 4 feet 3 inches, and 4 feet 6 inches in one instance. At Farnhill they varied from 4 feet 2 inches to 4 feet 6 inches. The cross sections of the river at this place show the depths which were at either side of the centre line. In August, 1863, the depth on the upper sill at Ardree lock was 4 feet 8 inches and on the lower sill 5 feet 6 inches. By this last depth the river was 5 inches shallower on that day at Dunbrin and Farnhill than it was in September last, but the past summer was one of abundance of water throughout the country, and the Barrow came in for its share. If you take 7 inches from 4 feet it would leave 3 feet 5 inches, which is what it was in 1863." "Ardree mill has commenced, the river in dry seasons as far up as a new weir above the bridge at Athy, something more than one statute mile, and when the sluices in this weir are closed down for the purpose of ponding the water higher up the river for the benefit of the mill at Athy bridge, the statute mile of river above described becomes a pond for Ardree mill, the water is soon worked to a low level, and boats carrying cargo take the ground in the shallow part at the mill, and remain there; less lightened until the river increases to a depth sufficient to float them off." I found on the 17th August, 1863, while the depth on the upper sill at Ardree was four feet nine and a half inches, there was one foot nine and a half inches flow over the mill-sludge at the mill. I saw the mill stop to let a boat pass. "It has been stated that ordinary means of dredging used in canals have been tried at these shoals and failed, owing to the hardness of the bed of the river. Steam dredging instantly suggests itself, but I fear a steam dredger that might go through the lock would not pass through some of the shoals which will not first despoiling them. Besides, a dredger would get one of these shoals which would move out of the way for trading boats which would cause delay and great expense. On the 2nd instant I specially prepared a strong iron bar of one inch three quarters, welded to the shaft of the mill in the ground and staked at

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"the points. It was driven down at Dunbrin in three places to the depth of twelve inches"—that is merely to break the surface—"and when removed, ruled in each instance, a flake about fifteen inches wide from the bottom of the river, leaving the gravel loose, into which I could easily work a sounding-rod of wood one and a half inches square six inches below the bed of the river. I tried it in three places at Farnhill, which is harder to penetrate than Dunbrin, and it disturbed the bottom to a depth of seven inches. It is also gravel and I put a sounding-rod three inches into it below the surface of the shoal. From these experiments I am perfectly convinced that these shoals can be deepened to the required depth without interfering with the traffic. There are stop-gate grooves in the masonry at the mill about sixteen feet north of the drawbridge where stop-gates can be put down. The canal water from the stop-gates to the lock can be drained off at the lock and leave the place accessible for men to remove the gravel which now renders it so shallow. The remainder of these shoals can be removed in the same way that I propose to remove Dunbrin and Farnhill shoals. Giving up the idea of steam dredging for the reasons I assigned, I would recommend that two or three very strong trident bars be used to loosen the gravel to the depth required, and then use ordinary dredgers to take it up and deposit it in some convenient place for repelling the towing path. A few blows from a small piling engine would drive the trident bar to the required depth, and so loosen the gravel with the least amount of manual labour and much more expeditiously. It might be found that once the face was out on the work a dredger might be able to remove the gravel without having occasion to use the small piling engine and trident. The time to commence this work would be in the early part of spring, when the river would be free from floods and the water low. It has been stated to me by the intelligent lock-keeper at Ardara, that boats do not stop at Farnhill shoal, the detention takes place at Dunbrin. I would, however, recommend the deepening of both shoals, as it would very likely arise that if Dunbrin shoal were deepened boats would in very dry seasons be delayed at Farnhill. These shoals I have described, particularly at the mill and Dunbrin, must have caused a heavy loss to both the Barrow Company and the Canal Company. The order to me does not ask for an estimate of the cost of dredging, but after having stated that the shoals can be deepened the question instantly follows:

"5624. You need not pursue that further. According to your description the bed of the river at Dunbrin is composed of gravel?"—Yes; just the very surface.

"5625. How do you account for its consolidation?"—I think it is the carrying down of small particles of lime which, getting between the pebbles, unites them, and forms a sort of concrete. Whatever be the reason it is there and can be taken out.

"5626. In 1853 did you make soundings at that particular point?"—I took soundings there, but not so particularly on these. The tendency of the mills to delay boats as the navigation is mentioned in my report of 1853. I have the 6-inch plan here if you wish to see it.

"5627. Mr. Barry.—This plan is much larger. Are there any other shoals that your attention was drawn to?"—Not like these.

"5628. Nothing so large?"—No; there is some gravel at the tail of tributaries where the streams enter the main river.

"5629. Have these shoals been removed since you made your report?"—They have not been removed since.

"5630. How much less water is there now over these shoals?"—I noted about nine inches.

"5631. It is not a very large surface?"—No.

"5632. It would not be a very great work to increase the depth?"—No.

"5633. Did you make an estimate of the cost?"—I did.

"5634. How much is it?"—£496. A great deal could be done by leaving room for one boat to pass; one could remain in deep water while the other passes. It is a great loss to be deprived, as at present, of cargo to the amount of ten or twelve tons.

"5635. Mr. Abernethy.—Was there any inconvenience felt in 1853, when you found the shoals there?"—Oh, yes, there was always inconvenience since the navigation was opened, and it must have been the cause of great loss to both companies.

"5636. Mr. Barry.—What do you take to be the statutory depth for navigation in the Lower Barrow?"—I do not know; but I have the depth on the dills that I took at the time.

"5637. Do you think that generally the depth of water on the dills at maximum was about the measure of what one might expect all the way down the river?"—It would tend to point to it. My general recollection is that there was plenty water on the sills; but I could tell you what quantity was on each of them by reference to my notes. Take, for instance, these shoals. There was six feet of water on the lower sill of Ardara lock. I found on the lower sill that the quantity on the 17th August, 1853, was 5 feet 5 inches. In 1862 when I took soundings there was six feet depth of water on the lower sill at Ardara lock.

"5638. Mr. Abernethy.—In instituting a comparison between the state of the navigation in 1853 and 1862 have you made cross-sections?"—Oh, no.

"5639. Mr. Barry.—Would you just look at this section, dated September, 1834, signed by Mr. Vignoles. Look at Ardara lock—the sectional line appears to show that there are no shoals between?"—The section is incomplete.

"5640. Do you think that the section indicates that when the navigation was opened the navigation was as high as the depth there—then the depth throughout the navigation was as great as that on the sills of the locks?"—Oh, no, because it remains the same as when I passed there the first time.

"5641. You are taking 1853 and I am taking 1834?"—It was that way in 1853, and it was left so.

"5642. Mr. Abernethy.—There was less water there in 1853 than in 1833, by what you show?"—Yes, but the shoal remains the same.

"5643. Mr. Barry.—You think that the shoal existed in 1834?"—I do; I think the shoal existed since the navigation was opened, because it never could have increased there.

"5644. You think it was never removed?"—Never removed, never.

"5645. Speaking generally, do you think that there is less depth between the locks than on the sills?"—Yes.

"5646. Mr. Abernethy.—Is the navigable channel?"—Yes. If you like to look at the maps we have all the depths.

"5647. Mr. Mitchell.—Are you in a position to say, Mr. Milwanny, that nothing was done at those soundings?"—Nothing was done at Dunbrin shoal since 1853. I heard that somebody expressed a couple of days ago, and I wrote down to Athy. I sent a telegram on yesterday asking "Did the Barrow Company get the shoal at Dunbrin deepened or dredged since '53?" The answer I got was—"In reply I beg to say they did not. I remember all the trouble you went to in trying what the expense of removing the shoal would be, but nothing has since been done to improve the navigation at this point." Going south along the river here [on the map] is Ardara shoal. The soundings are there three feet eight and three

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feet nine; that was in 1853. The depths of the other shoal were four feet eight and the lower five feet five. Here you will see three feet nine inches and three feet eight inches.

5618. That was in 1853?—Yes. I did not take soundings in any place but the navigable channel.

5619. Tilt shoal you say has been always there?—Yes, it has been always there. Taking now the next higher shoal—

5620. Mr. Pies.—This is the canal?—Yes.

5621. What are the depths?—Three feet ten inches entering. There is less depth under the bridge.

5622. The canal appears to be deeper there; those depths in the navigable channel of the river itself?—Oh, yes. I left the river there and followed the canal. Coming to the river again there is six feet six inches then four feet two. There is no fault to be found with four feet two, because in summer time the boats go over it, they being flat bottomed.

5623. Mr. Barry.—At what time of the year were those depths taken?—In September, 1853.

5624. Mr. Pies.—That would naturally be a dry time?—Oh, yes. On the other map we have Magurney bridge, four feet under the bridge.

5625. Mr. Barry.—You would not complain if you got four feet?—Yes, certainly not in summer. That is the minimum depth.

5626. Is there any Act of Parliament or any document describing four feet as the navigable depth?—I do not know. I think if they had four feet minimum depth there would be no complaint of the navigation, I think they would work with that depth.

5627. Mr. Pies.—Are those spots which you show on the first plan the only places in which the traffic was interfered with?—They are the places which were interfered with then and very much so when I was sent down to examine them.

5628. If those shoals were got rid of would you have nothing to complain of?—I think not. There are small bits of dredging that might be done at the tails of locks and mill races. I do not know whether you would care to follow the whole way down on the maps.

5629. Mr. Barry.—No, unless there was some special shoal to which you wish to draw my attention?—There are two or three other places below Carlow bridge.

5630. Mr. Abernethy.—In 1853 and 1863 portions of the river had shoals higher than the sills?—Oh, yes, and less water in them. Where there is no fall in the river you have to take the depth of water comparatively with the water on the sill.

5631. Mr. Pies.—Have the Grand Canal Company always been working over the Barrow navigation?—No, only since the Barrow Navigation Company gave up working over the canal to Dublin. The boats did not begin to work in the Barrow river until about 1878. At that time we had no canal of complaint.

5632. Were goods transhipped from one boat into another at Athy?—Yes, boats having a full load there were lightened.

5633. Mr. Abernethy.—You found at that time less water in certain parts of the river than on the sills?—Yes.

5634. Mr. Barry.—What is the depth of the Grand Canal?—About six feet, in some places it is more.

5635. Mr. Abernethy.—What is it over the sills?—Five feet six inches on the sills.

5636. Mr. Barry.—In your case the sluices are rather higher than the bottom of the canal?—Generally, yes, and it is a very safe way to have them, for a boat will go over the sill and won't touch the bottom.

Robert Mearns,  
Esq., M.P., Q.C.

Robert Manning, Esq., &c. further examined.

5637. Mr. Abernethy.—I may mention, Mr. Manning, that we have examined Mr. Barton lately. We commenced at one end of the river, and went on step by step to the other, asking him what obstructions occurred and what he proposed in the way of works to remedy them. It would be perhaps convenient if we adopted the same course now?—If you would permit me, I think I would rather commence by giving the information which the secretary asked us for in a series of questions. It would, I think, shorten the matter so proceed in this way.

5638. Very well?—I think the first question on which you wished to be informed was this:—"Were the works carried out in accordance with Mr. MacMahon's design; and the working drawings show less work than he designed; and was a less quantity executed than shown on those drawings; or is the present area less by reason of the secretion of silt?" The first thing to do would be to explain what Mr. MacMahon's design was, so as to know it exactly. It was to excavate a river channel capable of discharging 400,000 cubic feet per minute, under a certain flood level shown on the section. He stated that this would be accomplished at the Loughs by constructing a channel of about 1,400 feet, sectional area, with a fall of something more than five inches per mile, and that in the Carrage reach a channel of 8,000 feet area and a fall of eight inches in the mile would be necessary. I find both those statements to be practically accurate.

5639. Mr. Barry.—Do you mean the conclusion?—Yes, that is his statement as to the quantity of water discharged by both those means. They are both practically accurate.

5640. The quantity which would be discharged by a channel of that size?—Yes. He further states that it is not contemplated to carry one uniform breadth

of bottom throughout the entire length of the Loughs reach, except that the navigation channel shall in no instance be less than sixty feet. That is his design stated shortly. The next thing now is with respect to the working drawings to explain what they are.

5641. It is a sixty feet minimum bottom breadth?—Yes, a sixty feet minimum bottom breadth. From the working drawings the work was carried out by day's labour under the superintendence of the Board of Works. I find by making an examination of the working drawings that there was a design following closely the dimensions proposed by Mr. MacMahon. I find that Mr. MacMahon's design was substantially carried out, and there is evidence on the face of the drawings that great care was taken in working out the design as economically as possible, by arranging the fall and sectional area so as to give the discharge estimated by Mr. MacMahon. At the completion of the works Mr. Barton reported to the Navigation Trustees as to that portion of the work that, with the exception of Loughbeg, wherein the proposed channel was narrowed, it had been practically carried out. A sum was included in the award for additional dredging which was found necessary in Loughbeg, but that being found to be insufficient after the award was made, a grant of £1,800 was made by the Treasury on the 15th March, 1860. The works were completed on the 20th May, 1861. A steam dredger was handed over to the trustees of the Lower Barrow Navigation, and a hand dredger to the trustees of the Upper Barrow. After several public meetings were held and objections heard, the final awards were made for navigation and drainage on the 18th February and the 6th April, 1859. I should call your attention here to a statement which you will find in

the appendix to my report, page 77. It was made by Mr. John Hancock, who was secretary to the Drainage Trustees, and in fact took charge of their proceedings:—"The Board of Works" announced all "business as complete, and the works were commenced." They afforded immediate relief all through the district, materially lessened the pressure of the potato famine, and largely prevented the demoralization and pestilence arising under the melancholy circumstances, but the diversion to other purposes delayed the execution of the works, and largely increased the cost. However, in 1859, after holding courts in the district for the purpose of hearing objections, not one of any importance was made, and on the 4th April the Commissioners—Sir Richard Griffith and Colonel McKie—signed the final award, thus closing the capital account." It will be perceived from this that the whole matter of the cost of the works and the quantity of work done was fully entered into and finally arranged with the consent of all parties.

5642. There does not appear to have been any survey made by anybody connected with the drainage district at that time. Have you heard of any?—No, never.

5643. I would revert for a moment to Mr. Barton's report. He stated that he only examined the riverous navigation?—Yes; I shall proceed to observe upon that when I am speaking of Mr. Barton. Now with respect to the works being carried out according to Mr. MacMahon's design, I say that they have been practically carried out. I have examined the sections very carefully. Mr. O'Neill is here, prepared to show each section of the work carried out. But before I go into that I will show that more than the work that was agreed to was done. The Drainage and Navigation Trustees published in 1855 a correspondence and documents with respect to the question "whether the expenditure by the Commissioners of Public Works will exceed the original estimate." In fact so carefully were the works considered that they were anxious not to have any excess on the estimate that they thought might be unnecessary. Now here is a lettermarked number seven from Charles S. O'Hilly, Esq., to Professor Hancock, who then acted as secretary to the drainage proprietors. I need not read the whole letter. I shall leave the printed document with the Commissioners, and shall only call their attention to the fact that in describing the amount of expenditure, he shows that £5,000 was included for extra works beyond those proposed by Mr. MacMahon. Mr. O'Neill has prepared a set of tracings showing the bed of the river before the works, the lines of the proposed excavation, and the actual state of the river in the year 1884. These are laid down on tracings so as to be readily compared. I carefully examined these sections, and the following facts appear plain:—More work was done in some places than was contemplated by Mr. MacMahon; thus in the lower reach of the river from Longhams to the Outa, where he reported that the natural river was sufficient for all purposes, a considerable quantity of excavation was done over that laid down in Mr. MacMahon's section. Through the Kilken shiel the sections in 1884 were from 2,066 to 2,451 superficial feet, the proposed section being 2,060. This increase may be accounted for by the necessity of having the bottom gradient regular. I before stated that they did not carry a regular breadth for a very obvious reason through the channel, but they were bound to carry out the gradient for the navigation, a course that imposes sometimes, in spite of them, more cutting than they would otherwise account. Secondly, as to accretion, in several cases the sections show that there has been a deposit of silt at places where no excavation was made, or was ever intended to be made. Thus at about three and one-eighth miles from Coleraine bridge the section of the natural river before the works was 1,848 superficial feet; it was increased to

2,123 superficial feet; but in 1884 the accretion in the excavated channel was 63 feet, and where no works were executed at all there was an addition of 237 superficial feet, making a total silt up of 320 superficial feet.

5644. To the sectional area?—To the sectional area that is, reduced the sectional area by that amount. A quarter of a mile farther up the section of the natural river was 1,840 superficial feet. Mr. MacMahon's section was 2,318, and in 1884 it was 2,384 superficial feet. At 10½ miles from Coleraine bridge there was an obvious accretion of 350 feet.

5645. Are you giving all the instances of accretion that you have met, or merely illustrative instances?—Merely illustrative instances. Leaving it to Mr. O'Neill to go over all the sections if you like, I merely give these instances as I pass on. At Periglenes bridge it was found, in 1884, that the bottom level was carried eighteen inches deeper than had been designed, still there was a silt up of 689 superficial feet, and in one section the area before the works was 1,872 superficial feet, but in 1884 it was 1,645 superficial feet, showing a decrease of 227 superficial feet. In the new channel executed at Longhams, the sections varied, in 1884, from 2,390 to 1,546 superficial feet. In fact the sections show that there was a gradual accretion through it, and a bar at one particular point.

5646 Mr. Abernethy.—What point was it where the bar came up?—I will show you the section; it is number 561.

5647. We will look at it afterwards?—Winding up this subject, I may say that on the whole, considering that a steam dredger was presented to the Navigation Trustees, in 1861, for the purpose of maintaining the channel, and that the Drainage Trustees dredged a quantity of 61,000 cubic yards out of the Toome weir basin, in 1878, in a length of a few hundred yards, I can come to no other conclusion but that there must have been a large amount of silt in the remaining thirty miles of the river, and if it cost the Drainage Trustees £34,195 to maintain their part of the works in twenty-eight years, I fail to see how the Lower Bars could be maintained without any expenditure whatever, for the same time.

5648. Mr. Barry.—Can you give us any measurements of the amount of silt that you consider has taken place?—Certainly; Mr. O'Neill can give you all the particulars; as to the silt we cannot weigh, because it is merely the area I speak of, but there are some places where it must be obvious, where no excavation was made at the natural bed of the river, and where the natural bed is now higher than it was.

5649. Have you satisfied yourself of the quantity of accretion?—Oh, no; I have satisfied myself that it would take a certain sum to make the channel now what it was said to be left at, and what I believe it was at the conclusion of the work.

5650. And what is that amount?—£250,400. You will find it at page 9 of my report.

5651. That is the result of your own view of the case, apart from Mr. O'Neill's?—Mr. O'Neill merely laid down on the tracings the different lines, and I took my own view, looking over every section as I went on.

5652. I thought it probable that your estimate was based on 2,400 square feet?—I find it clearly stated here in Mr. MacMahon's report that he intended to take 2,000 feet out in some places. Here is his statement—only 2,000 feet. If the quantities of accretion or whatever it was have been calculated from an assumed area of 2,400 feet through the whole, they must be in some respects wrong.

5653. Mr. Abernethy.—Did Mr. MacMahon state that 2,400 was to be uniformly carried out?—Oh, not at all. He stated that it was to be carried out in a certain reach.

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5654. And confined to certain reaches of the river?—In fact the design was that the channel must be formed by increasing, if necessary, the natural channel, so as to discharge 400,000 cubic feet per minute at a certain level. Mr. O'Neill went into all that—he has calculated it. But, on the whole, I would say to restore the works to the same state as in 1861 would cost £25,400. You might take £1,000 or so off, but I think I would not be inclined to lower that estimate. Now, with regard to the question—"Was the estimate of the maximum discharge by Mr. MacMahon of 400,000 cubic feet per minute to 500,000 cubic feet per minute an extraordinary estimate, which was made forty-two years ago, a reasonable approximation to the truth?" I would first observe that it has been talked of as 400,000 cubic feet, but he has considered that 500,000 cubic feet, under certain circumstances stated, will be discharged below the level stated. This question is best answered by the facts given in Table No. 3, at page 16, of my Report of 1864, from which it will be seen that only on one occasion in twenty-one years the maximum discharge reached 524,000 cubic feet per minute, namely, in December, 1872, and on two other occasions during the same period, in the month of February, 1867, and in 1875 it reached 495,000 cubic feet per minute, and it may now be observed that Mr. Barton proposed only to provide for a discharge of 584,000 cubic feet per minute; so that the hope of more than a quarter of a century since Mr. MacMahon made his design, of which Mr. Barton and everyone else have the advantage, and from what we have learned of hydrology since, I do not think there is any great variance in estimating the discharge.

5655. Mr. Barry.—Do you know how much was calculated to be discharged at the Cutts when 400,000 cubic feet was discharged at Toome?—No; there is no statement in my report as to drainage beyond Toome, but I think it may be inferred that he only proposed to discharge 400,000 cubic feet down to Loughans, because his channel is designed for that purpose. Therefore I do not think that Mr. MacMahon did propose to increase the quantity to be discharged in the floods.

5656. About what quantity comes in between Toome and the Cutts?—That I would not like to say, without looking over the plan. I will come to that matter a little farther on. You will find that above Toome there is a quantity of over 20,000 acres of land, whereas down at the Cutts, there are only 2,300 acres of land, and that in fact as a drainage district you may take the termination of it at Portna.

5657. We saw a very considerable stream coming down at Aggrey?—Oh yes; what I mean to say is with regard to the area drained. Here is a section I made myself. There are 21,160 acres above Toome; from that to Portna 6,032 acres to be drained.

5658. Mr. Abernethy.—What is the proportion of catchment area above and below Toome?—That is given on the plan attached to Mr. MacMahon's report; below Toome is 340 square miles, and the whole catchment is 2,215 miles. What I was saying was this, that as a drainage district it practically ends at Portna, for there were over 27,000 acres flooded above that, whereas down to the Cutts there were only 2,300 acres, in round numbers. Therefore I do not think Mr. MacMahon provided for any increased discharge below Toome. The important point was to find out how much was discharged there, and they were not, I think, particular enough below.

5659. Mr. Barry.—Then we might take it that the channels designed by Mr. MacMahon below Portna, were not small for the discharge of floods?—I think so.

5660. The extent would depend on the amount of water coming down from the tributaries?—Yes, it depends on the amount of water coming down from the tributaries. I shall come to that question. I

find with regard to the 2,000 acres I have just spoken of, in my opinion, which I expressed in my report of 8th June, 1877, page 4, the observation—"I have no hope that any material improvement can be made in the condition of those lands. I find on examination of the papers referred to me that the same opinion was entertained at the time of making the award." The case appears to have been well considered and an statement of the drainage charge made in consequence. This will appear on comparison of the draft award with the final one. It will be sufficient here to say that in the case of two of the London Companies—the Metcros and the Ironmongers—the amount of the half-yearly instalments was reduced from £185 13s. 6d. to £165 17s. which represented an abatement in cash of £207 4s. 3d.; so that the insufficiency of the drainage was known at the time of the award, and an abatement made in consequence of the deficiency.

5661. Do you consider that no improvement can be made in the case of the 2,000 acres of land below Gernoe, either by deepening the channel at Loughans Island, and putting a sluice on the Cutts weir or by outbanking?—On the contrary, I propose that additional excavations should be made at Loughans Island.

5662. I thought you said, "I have no hope that any material improvement can be made in the condition of those lands?"—Yes, in my preliminary report, and then, as you will find at page 9, I say—"Whether it is expedient to provide for the discharge of such a flood as that which occurred in February 1877, and which much exceeded any other before or since for a period of thirty years, is a question which I am unable to answer, and must leave it for others who are more competent to decide. But an engineer may be fairly asked to state what works for the improvement of the district he would propose to execute if left to his own judgment. After a very careful and anxious consideration of the facts now laid before the Board, I beg to make the following recommendations:—First, the channel of the Lower Burn should be restored to the capacity designed by Mr. MacMahon; secondly, the discharge of the weir at Toome, Portna and the Cutts should be rendered more effective by the construction of powerful sluices in each of them; thirdly, additional excavations should be made at Loughans Island, and the lower parts of Moosquin, Ashderry and Aggrey tributaries should be improved and embanked." The drainage of these 2,000 acres of land is estimated to cost £6 an acre.

5663. Mr. Abernethy.—There is a very large tract of flat land extending near Aggrey bridge?—Yes, that point that you now refer to is within the district I have stated, in which there was 2,000 acres of land to be drained.

5664. There is a very large tract of land flooded beyond that, I apprehend?—No, on the next reach there is only seventy-eight acres.

5665. At this particular bridge, which spans Burness and others pointed out to us at Aggrey?

Mr. O'Neill, c.s.—That is the 2,000 acres to which Mr. Manning refers.

5666. Is that all above and below the bridge?

Mr. O'Neill.—Yes.

5667. They pointed out a considerable distance to which they said the floods came. Is the quantity of land between that and the river not more than 2,000 acres?

Mr. O'Neill.—I think not.

Mr. Manning.—It is exactly 2,000 acres.

5668. Is that the limit of the flooded land?—It is the limit of the flooded land that has been charged for drainage.

5669. You proposed certain outbankings?—Yes, I mentioned to-day that I proposed to do some works although in my preliminary report, "I have no



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"hope that any material improvement can be made "in the condition of those lands." I find that for those 2,400 acres it would cost £12,000 for works alone, besides the cost of sluices, but I think it a proper work to do. Whether it is expedient to do all this I do not say, but I may say what improvement could be done in the district.

5670. Quite so. Will you state what you recommended generally?—The works started in the third scheme here—that additional excavations should be made at Leaghin Island, and that the lower parts of Blinacuan, Aladavey and Agvevy tributaries should be improved and embanked. I think that does this part of the evidence that I wish to give, except only that I do not wish to enter into a discussion as to Mr. O'Neill's and Mr. Barton's opinions, but I find in the evidence that Mr. Barton rather objects to Mr. O'Neill's calculations of the quantity of water going over Portna weir.

5671. Mr. Macmahon—Yes, there is a difference. Well, if you will kindly refer to that evidence you will find that Mr. Barton's statement comes to this, that the district above Toome has a catchment basin of 1,200,000 acres, the reservoirs being 100,000 acres, as compared with the lower district having a catchment basin of 70,000 acres and no reservoirs except Lough Beg; and he imagines, which I think a mistake in the hurry of the moment, that he can compare the discharge of those two. I do not think Mr. Barton intended that, but as it is published in the Minutes I would like to refer to it.

5672. Mr. Barry—I understood Mr. Barton to say that he could realize a discharge of 550,000 cubic feet a minute at Toome weir for £40,000.—Yes, much less than that. I will come to that, if you will allow me, in a little time. We now come to Mr. Barton's scheme. To effect the objects arrived at by Mr. MacMahon, that is the drainage of the land, Mr. Barton proposes in his report, as you will see at page 65 in the appendix to my report, left-hand column, top line, to expend a sum of £10,000, which is only £400 less than I stated was necessary to restore the channel to the state in which it was left in 1832. He says—"By working out the economic effect of excavations at different places, I have designed works which will be recommended, and am of opinion that the works I have designed will, at a cost of £25,000, effect the following objects—first, maintain the level of Lough Beg at and under two feet over summer level, or forty-eight above datum, except in such rare floods as have occurred only three times in the last twenty years; second, will keep the floods in and about Lough Beg one foot lower than they now rise to, and in moderate floods probably eighteen inches lower than they now are; thirdly, will lower the floods of the Agvevy flooded district one foot also. "This amount includes £3,000 for works which the Navigation Trustees should pay for." For that project, by his recent evidence, he has increased his estimate to £40,000. But it is a most extraordinary fact that Mr. Barton proposing to effect the very selfsame thing that Mr. MacMahon proposed, and expressing his certainty of being able to accomplish it, should, in his estimate which I have just read, made in the year 1831, state £400 less than the amount which I had judged to be necessary to be expended in restoring the works to what Mr. MacMahon had designed; that Mr. Barton's estimate of the cost required to do all that Mr. MacMahon proposed should be £25,000, while my estimate to restore the works to Mr. MacMahon's scheme is, estimated independently at £20,400.

5673. You would not imagine that to anything but a coincidence, because Mr. Barton states that the quantity of water provided for by Mr. MacMahon is insufficient?—Mr. MacMahon said 500,000 cubic feet per minute could be discharged without injury to the lands above Toome.

5674. Mr. Abernethy.—At the same time he worked a design for 400,000.—Yes.

5675. Mr. Barry.—Mr. Barton says, he estimated that, lowering the crest of certain weirs without deepening the bed of the river, would pass 550,000 cubic feet per minute at Toome, and 625,000 cubic feet per minute at the Cotts.—Yes. I shall give you my opinion about that a little further on. The reason he takes to do that are not the same ones as I do. He proposes to reduce the height of the weir at Portna by two feet, and he has explained that this will lower the water at Portlough, about seven inches further up, by one foot. You will see that in Mr. Barton's report, at page 65, where he says—"My examination "of the subject led me to see that the navigation works "arranged for eight feet deep channels, might, without "seriously affecting the navigation, be reduced to six feet, "and a calculation of the effects upon the river in high "floods of this alteration by lowering all the weirs "except Toome two feet, demonstrated that in high "floods the lowering of the weirs two feet would have "about the same effect on the flooded districts as their "removal." Well, now taking that statement, that he would reduce the height of the water at Portlough by one foot, to be correct, the water at Toome, the most important point of the whole district, and which is sixteen miles from Portlough, would not be lowered by a fraction of an inch. It is quite obvious that if the surface level were a straight line, and that if you reduce it in seven miles by one foot, in sixteen miles it will be about six inches; but everyone knows that the surface of water which is moving under variable motion, is not a straight line, but is a curve, and that it would not lower the water at Toome at all. I can show, by the section the second set that it does not. Now, he does not state in his evidence whether he purposed to lower Toome weir.

5676. Mr. Abernethy.—He does not mention any works at Toome.—No, he does not mention any works there. If he does lower the weir at Toome two feet, the consequence will be, that the Lagan, the Upper Bacon, Tyrone, Newry, and Ulster navigations will be destroyed altogether. It will not do, even to pass a lock at the end of these navigations, because these are shallows which would prevent the navigation being made. But suppose he does not intend to lower it, the condition at Toome will remain the same except for any excavation he may make, and even then the weir would be lowered five feet. As to the maximum quantity to be discharged, which he estimates at 550,000 cubic feet per minute, Mr. MacMahon anticipated that it might reach 600,000. That is shown at page 26 of the appendix, and he merely supposes the case of such a discharge, not that the thing will actually occur. Mr. Barton rather differs with me, he says, in the quantity of water to be discharged. Now, I beg leave to say that the maximum does not entirely depend upon the quantity of water entering Lough Neagh, but upon the level of the lake two months before as stated in my report. Thus, in the flood of 1877, for seven days the average quantity discharged into the lake up to the 3rd February, 1877, was 1,000,000 cubic feet per minute. I have calculated day by day the quantity of water necessary to be discharged during that flood, and I find that to free the basin a quantity of 514,000 cubic feet per minute should have been discharged on the 2nd December, 1876, rising to 834,000 cubic feet per minute on the 3rd February, 1877, for those seven days. That will be reduced to about 670,000 cubic feet per minute if we allow the flood to pass without injuring the lands as proposed by Mr. MacMahon. I give that as a suggestion because in nature, of this kind, no matter how eminent a man may be, no opinion should not have sway. You must calculate the whole matter, throughout, these are facts.

5677. Mr. Barry.—You take the discharge from the river; you calculate what quantity would be going

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over the weir, and you found the difference—I calculated the daily quantity that was going over Toome weir. I noted the rise or fall of the lake, plus or minus the daily quantity over Toome weir, and I say that is the quantity I have to deal with every day. I sure all that through the whole duration of this flood, and then I come to deal with it. There is one other subject that I have to deal with, and that is as to Mr. Barton's remark, that I really did not believe myself, that if Mr. MacMahon had carried all the works out, £16,000 would now restore them to the state in which they were designed by him, and that there is a necessity for doing more; and he points out that I proposed an extra expense of £30,000 more. I can only say this, that out of that £30,000, £13,000 was for additional works in the lower reaches, to which I refer in my preliminary report of the 8th June, 1857, and that the other item, £16,000, is for sluices, and repairs to Toome weir. The objects of these sluices are two things—first, a practical measure to increase the discharge of the weir at the beginning of the flood, but the most important function of these sluices at Toome weir will be in scouring sluices. You will require them, for sifting in the *foss or verge* of the floodings.

5675. Mr. Abernethy.—Mr. MacMahon has dealt with 400,000 cubic feet per minute. He seems to have taken that as data throughout the whole of the proposition—I should point out clearly what is no doubt the fact, that the quantity of water is not dependent on the quantity of rain; that if you commence a flood with the minimum level at Lough Neagh, you never have a flood of 400,000 cubic feet per minute in the river, but if you commence when your river happens to be full, you have a great flood. If you will kindly look at the tables at the end of my report you will find that for the whole of those twenty-one years there was no flooding at all, but the moment you allow accretions to take place below Toome, and you destroy your reservoir in the lake, you are obliged to discharge the flood.

5679. Mr. Barry.—Mr. MacMahon assumed that the lake would never stand more than two feet above summer level—Yes.

5680. That was the condition under which the drainage was undertaken, and for which the rate was made—Yes.

5681. Do you think that if £25,400 was spent on the river, and nothing more was done, that the lake would never rise more than two feet above summer level. You say that £25,400 ought to be spent on the river to put it back into the state in which it was before—Yes.

5682. Assuming that was done, are you of opinion that the flood in the lake would never rise more than two feet above the summer level—Certainly not: the same thing will occur as has occurred for twenty-one years, and flooding will occur again if the river channel be neglected.

5683. It is a very important question to consider in dealing with this subject. If this £25,400 that you estimate should be spent on those works, will the lake, in your opinion, ever rise more than two feet above summer level?—Not under ordinary occasions, but certainly in extraordinary occasions.

5684. Mr. Abernethy.—It will rise above that level?—It will rise above that level.

5685. Mr. Barry.—Then to that extent Mr. MacMahon was wrong—I think not, because he states that a flood of 500,000 cubic feet every minute will be discharged without injuring the lands.

5686. Mr. Abernethy.—But all his calculations, his estimates, and everything else, were based on 400,000 cubic feet—Yes; but he will allow for the flood, he does not anticipate that it will occur, but if it does occur no injury will result.

5687. Then you propose to spend £25,400 to carry on and complete works that Mr. MacMahon said should be carried out. He states that if these works

are done the flood will never rise above two feet over summer level. But you differ in opinion from him on that point, and say that the floods will rise above two feet—I will refer to Mr. MacMahon's statement. Here is his statement:—"When from a long continuance of rain, and consequent accumulation of flood water, the rise over the summer surface amounts to twelve inches, the discharge will be increased to nearly 400,000 cubic feet per minute. The maximum discharge has therefore been taken at that, due to twelve inches over the proposed summer level. But should the rise occasionally exceed by a few inches, which is all that can occur, the continuous range of the level, so as to increase the discharge even to 500,000 cubic feet per minute, no damage can accrue to the works, or injury to the lands, on the elevation will be effectually controlled by the extraordinary compensating power of Lough Neagh and Lough Beg as reservoirs, enabling means to be adopted by which the influx and efflux of the flood water will be so balanced that the rise can never overflow, nor can the capacity of the improved channel of the Lower Bann be overflowed by a greater body of water being thrown into it than it can, without prejudice to the land on its banks, or to the navigation connected with it, discharge." He further shows in his section the line to which the floods may be permitted to rise. (Map produced).—Here is the proposed flood, and here is the line, "level of meadows."

5688. Mr. Barry.—He puts the level of the floods at 45, 47, and 48 feet as the extremes—Yes.

5689. Mr. Abernethy.—45 and 48 as extremes—Yes.

5690. Mr. Barry.—45 feet is 2 feet above summer level is it not?—Yes. In my opinion in extraordinary circumstances if these works were executed the water would rise to 49 without injuring those lands.

5691. If that be so, Mr. Manning, £25,400 is all that need be spent on works on the Lower Bann, is it not?—Yes, but from the circumstances just mentioned, if I had the power to make a recommendation, I would certainly put in sluices in Toome weir in addition. Certainly.

5692. But that would be the limit of what you would do—I would say, if you ask me what would I advise you to spend, that the least thing you could do is to, I would say, £40,000 in round numbers.

5693. Mr. Abernethy.—What would you do below Portna—I would abandon everything below Portna.

5694. You would do nothing with the weir?—That is a matter on which I would not give an opinion. You know the quantity of land and what it would cost. But considering that the great bulk of the land lies above Portna weir I say that is the weightiest, and I do not consider that it would be met with an expenditure less than £40,000, which would be spent on excavation and constructing sluices in the weir at Toome and Portna.

5695. But you would do nothing in the way of deepening the weirs at the Cutts or Loughan's island—I should consider that. I think that probably if you put £12,000 to it, that is all I would do below; and the total estimate would be £52,000.

5696. How would you apply that £12,000?—In excavations. It is the work, number 3, mentioned at page 9 of my report. I would not touch the Cutts weir.

5697. Mr. Barry.—Then you would not touch Portna weir?—Yes; I would.

5698. What would you do at Portna?—Put sluices.

5699. You would not touch the body of the river?—No.

5700. Have you at all considered whether the navigation channel could be used to discharge the flood at Portna?—I do not think if you took the whole navigation channel and took the locks out of it that you would lower the level of the water at Toome an inch during a high flood.

5701. Mr. Abernethy.—Would the level of the lake be lowered?—No, you cannot lower the level of the lake, but you will lower the water in summer. I would like to consider that more fully, but so far as I can see now you would acquire no material advantage by abolishing the navigation at Portlengone.

5702. Mr. Barry.—You mean unless the channel is enlarged to Portlengone above Toome, you would not lower the level at Toome?—The key to the discharge of the lands above Portlengone is Portlengone itself. Here (on the map) is the level of the flood of 1837. The water was low enough there, but the flood surface turns like a hinge at Portlengone. In summer you have it perfectly level. In ordinary floods you do some good, but in extraordinary floods you do none at all.

5703. That is what I said—without excavating the channel you would not lower the level at Toome by increasing the descent down to Portlengone?—In extreme floods you would not.

5704. But part of the works that you would recommend would be enlarging the channels as they now exist between Portlengone and Toome?—Oh, yes, certainly. If you make a new cut at the northern end of Loughbeg, and to clear out the channel at Toome well, you then lower the level.

5705. Would any part of the £25,000 be spent on Portlengone?—Oh, yes.

5706. It would only be spent so far as accretions have taken place?—Only so far as accretions have taken place.

5707. There is a large obstruction at Portlengone, apart from accretion, is there not?—No, I think not.

5708. I thought there was, but I will take your correction?—I think there is not. Mr. O'Neill will tell you.

Mr. O'Neill.—There is a considerable obstruction at Portlengone.

5709. Mr. Abernethy.—Below the bridge?—(Mr. O'Neill).—Below the bridge. I think there must be more or less accumulation also.

Mr. MacMahon.—There is no doubt of accumulation. 5710. Mr. Barry.—Then would you, to get it on the notes, put together what you would recommend should be spent on the Lower Burn, because it is a little different from what appears in page 9 of your report?—Yes.

5711. Mr. Abernethy.—Would you state how you would spend that £40,000?—I had better, if you permit me, fill in the statement of the particulars of the £40,000 when I come to revise my evidence.

5712. Mr. Barry.—That will do. Do you consider that the floods come down more rapidly now than they did 30 years ago?—I do not think so.

5713. Do you think thorough drainage has increased the rapidity in the discharge of the water?—All surface improvement of land will increase the maximum flood.

5714. Mr. Abernethy.—The earth contains the rain like a sponge. When drained the floods come down in a short time?—It is very difficult to give a general opinion, but what will occur may be this—if you have a sloping surface, and the soil is perfectly impervious, the water will run off the surface into the river immediately, but if you thoroughly drain the land you are supposed to dry that land for three or five feet from the surface, and before the water can get to the river it must go through that five feet of soil and therefore it will decrease the flood instead of increasing it. The reason of draining land is because it is more or less impervious; if it were not impervious you need not drain it. I merely give that as an opinion.

5715. In England drainage carried out rather tends to show, and in fact it is undoubted, that floods rise

higher and in a shorter period of time than before the lands were drained?—These matters are very difficult to decide. I think a fair way would be to take every case by itself, examine it clearly, and get all the knowledge you can have yourself or obtain from anyone else. There was, some years ago, as we all can remember, a theory that in all the whole world the quantity of water discharged by rivers had become less. It is impossible, in my mind, to establish any general theory on the subject.

5716. Mr. Barry.—Along the Upper Burn, you know the low-lying land between Portlengone and the lake?—Yes.

5717. Have you considered whether that land might be protected by banking from floods?—I have never paid any attention to that, but certainly, in my opinion, it cannot be protected in any other way, except by keeping the surface of the lake low; but if you cannot do that it would, no doubt, be proper to embank those lands. In fact you may have observed at Portlengone a large factory built upon those lands, and they have a sort of dyke or ditch about it. I do not see why they should not do that to prevent one of those heavy floods from remaining for a month or less than a month, and then pulling up their sluices to let it flow out.

5718. You say if Lough Neagh could be so controlled as never to rise above two feet over summer level, it would be a very great benefit to the whole neighbourhood?—Certainly it would be a great benefit.

5719. And that would extend not only over the Burn but the Blackwater and other rivers flowing into Lough Neagh?—Yes; but the question of the sanitary effects of drainage is a very abstruse one. We frequently make a mistake between past *do* and *propter hoc*. We find that we have not disease after drainage and we then say that it is all because of the drainage.

5720. Mr. Abernethy.—Some parties do not wish embankments to be made?—Yes; I understand that one of the proprietors along the Blackwater objected to his lands being embanked, as he merely used them for pasture and probably coarse meadow. I know that in a district that I excavated works in, so as thirty years ago, at the special request of one of the proprietors I did not embank his land. There are circumstances which might make it proper. If the area of land along the river was small, and if he wanted this land only for cattle in summer, I think he would do as well without the embankment. But no doubt where there is a permanent high level of water during the summer season, you have nothing to do but to embank.

5721. But to embank?—But to embank. Here is one of the Portlengone sections (map produced); there is the original bottom, and there is the accretion shown.

5722. Is that the original bottom in Mr. MacMahon's report?—This is the original bottom on detailed sections, which are made in our office.

5723. When were they made?—They were made before the report was made.

5724. When was that?—The report was made in December, 1845, and on those dotted lines that you see there, the report was founded.

5725. Mr. Barry.—Mr. MacMahon's report?—Mr. MacMahon's report. The dotted line is the original level. Here is the section (number 227), immediately under Portlengone bridge (map produced). Mr. O'Neill informs me that he sounded there and got down to the bottom, and that it was soft above it. This line here is eighteen inches lower than Mr. MacMahon's gradient.

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Robert MacMahon, Esq. C.E.

March 11, 1887.

Mr. William  
James O'Neill,  
c.s.

Mr. William James O'Neill, c.s., further examined.

5723. Mr. Barry. — You are acquainted with the navigation out at Portna? — Yes.

5724. What is the sectional area of that cut? — It is fifty feet wide, and eight feet under summer level.

5727. What is the amount of fall at the two locks which lie at the northern end of it? — The amount of fall on the sills of the locks is 14 feet 6 inches, but the actual fall, from the surface of the water to the tail water, varies very much according to the quantity of water coming over the weir.

5728. What would it be in flood time? — Eleven feet when 400,000 cubic feet per minute is passing over the weir, and less when the volume is greater.

5729. Eleven feet? — Yes; if there was more water passing over the weir, which frequently there is, it would be less, but I have not gone into any calculation higher than 400,000 cubic feet per minute.

5730. Talking that difference between head and tail, how many cubic feet per minute would pass, supposing the gates of the lock were all removed or shut back? — 434,000 cubic feet per minute, supposing an inclined plane from the upper sill to the lower sill.

5731. Then take the lock, and supposing the gates removed, and that the sills remain intact as they are now, is that correct on the supposition of that discharge? — Yes, this is quite correct. The lock without being widened, and the inclination I have shown here, it would take the flood according to the quantity passing over the weir. When it is 400,000 feet, the inclination of the flood by the surface of the water is shown by a blue line, and when 45,244 cubic feet per minute pass Portna, by a blue dotted line.

5732. Mr. Abernethy. — Is your calculation of the drainage founded on the supposition that that decline was made? — Quite so.

5733. Mr. Barry. — Supposing that incline was not made, and supposing that the locks were kept intact, and supposing that the gates were removed or shut back, would that make any difference? — It would make no difference. The reason I suggested the incline in the lock was simply that I believe the masonry would give way to such a torrent of water without it.

5734. It is a matter of precaution against damage? — Quite so.

5735. Have you been able to form any opinion as to how far the effect of such a discharge from the navigation there would extend up the river? — I have; in 1873 I made a calculation, and that was afterwards confirmed when I took cross sections, for the first time, in 1877. That showed that my previous calculations, although they were approximate and from insufficient data, were correct substantially.

5736. How far would it extend? — One mile, but that is when there would be a maximum flood in the river. Of course in summer or when the flood is at its lowest the effects would be much reduced. You have my report of 1877.

5737. You had an estimate before the Commission which amounted to £28,500 for what you considered necessary for the improvement of the river? — Yes.

5738. Some of that is for excavations at Portna weir, and some for works made at Portlengone? — Yes.

5739. How much would your estimate be reduced if Portna sluices were omitted? — It would not diminish the cost at all.

5740. Why not? — It would diminish the cost for sluices, but it would not affect the works in the upper channel through the rock and other parts of the river.

5741. Would it not affect the whole of the excavation below Portna weir? — The special excavation required for the sluice?

5742. Yes? — I do not think it would altogether.

5743. Did not your estimate include something for excavating below Portna weir? — Not except for the sluices. We found the sluices and also the weirs

would effect everything required from Portna to Curra. We do not propose dealing with anything but two reaches, the nine miles reach from Curra, and the fifteen mile reach from Toome.

5744. How much excavation was there at Portna, in your estimate? — I may say that we had not perfectly fixed what the excavations would be at the different portions of the river. But if you allow me to make a statement in general terms it will give you an idea about the scheme. We propose excavating the channel at Portna.

5745. Above the weir? — In the rock behind Portna.

5746. Above the weir? — Above the weir to a sectional area of 2,400 feet. But at Portlengone and at Toome we propose to excavate 3,000 feet area so as to be quite certain of relieving Toome weir from backwater.

5747. Then you think that to ease the navigation there they would not use any money, in your estimate? — It would save the excavation connected with the sluices.

5748. And the sluices? — And the sluices at Portna.

5749. What would be put for that, approximately? — I think I recollect our agreeing with Mr. Barton about £10,000 to be spent at Portna and in its neighbourhood. It was £10,000 that Mr. Barton suggested, but I could not say that I perfectly agree with Mr. Barton about it, the subsequent cross sections confirmed my dissent.

5750. Mr. Abernethy. — Do you say that putting in sluices in the weir would relieve the floods? — I am of opinion that it would relieve the floods by making a great and necessary improvement in the channel, which I believe to be very much at fault.

5751. Above? — Above.

5752. At a cost of £10,000? — I cannot say that I agree with Mr. Barton about the amount. I was asked by our Trustees to read over the report and have an interview with Mr. Barton. I had an interview with Mr. Barton on two occasions, in which I contended for the necessity of excavating a deeper channel behind the weir at Toome, showing that without it we must lose there a fall of fifteen inches in one mile. After spending two days at it he said, "Well, I will agree to £10,000." It is only about half of what I consider necessary.

5753. Mr. Barry. — What amount of water comes into the river below Portna weir in time of flood? — Below Portna from the catchment basin in 150 square miles. I would say in a flood, 180,000 cubic feet per minute.

5754. Then in round number we may say that assuming 400,000 coming over the weir at Toome, and 200,000 below Portna weir, you ought to have command at the Cutta over 600,000, or the floods will gain on the river? — There would be more. In dealing with the catchment basin between Toome and the Cutta, if you take this catchment basin it will be more than double that because it is 340 square miles. It is considerable sometimes below Portlengone.

5755. Assuming 400,000 coming over Toome weir you ought to have command for nearly 800,000 at the Cutta? — I think so, but I think there must be some consideration given to Mr. Manning's suggestion that the area to be relieved there is too small. It is a question whether it would be worth the expense. I think myself by combining the system of embankment, perhaps starting at Agriety and at some points of the river where the lands are very low; removing all sharp bends from Agriety tributaries, and improving the channel at Longlans, would lower the floods materially.

5756. Mr. Abernethy. — A light embankment would relieve a good deal of the land from floods? — Yes, combined with a certain amount of improvement which I would recommend in the Bann and tributaries.

5757. Mr. Barry.—You would suggest sluices at the Cuts weir?—Yes, from what Mr. Graham and the other day about there being considerable parts of the year that there would be very little flow there. It is a good tidal river certainly.

5758. I suppose the amount of fall at the Cuts would depend on some tides and spring tides?—It does, but it is not the volume which I fear that would gorge the tideway. I am certain if those improvements are carried out we will never have the huge flow passing down that has passed, because they are entirely due to accumulations in Lough Neagh. But by improving the river so as to make the average flow more than at present, and not having such huge volumes passing down, it would be otherwise.

5759. Mr. Abernethy.—By removing the shoals below Agavey bridge, and putting sluices in the weir at the Cuts, and deepening the channel above the weir at the Cuts, and the formation of light embankments below Agavey bridge, you think a good change would be effected?—I am sure it would.

5760. Mr. Barry.—It was represented to me yesterday by a local gentleman that embankments must necessarily fail at the land in question, because the water rose through the land, and would rise behind the embankment. Do you attach any importance to that view?—I do not, because I do not know any land down there so unfavourable for embankment, as we have embanked in the county Armagh, and some places where you were yesterday.

5761. Mr. Abernethy.—Quite so; we saw a light sandy soil there in various places?—If you saw the embankments near Moy, above half a mile by the

river, the ground is very low, pent some of it. The embankments are five feet high. I was obliged to excavate trenches there. I mixed clay and gravel and bag together, put them in layers, and had them well pounded, and it is perfectly effective, and keeps out the water.

5762. Mr. Barry.—How many miles of embankments had you under your charge?—I think 33.

5763. You know the land between Portadown and Lough Neagh?—I know it very well.

5764. Do you see any reason why that land should not be embanked?—I think it would be a very proper way of dealing with it. I many times wondered it was not embanked, because the flood water does not rise so very high.

5765. You see no difficulty in embanking at low-lying land?—No.

5766. Have you the figures in connexion with the embankment on the Blackwater?—I have.

5767. What is the extent?—It is about 35 miles.

5768. Can you give us the yearly cost?—Yes; for twenty-six years it cost £335, that is, £24 per mile per annum.

5769. Have you the original cost of your embankment?—No.

5770. From your knowledge of such work what would you say would be the price per cubic yard for the formation of an embankment above and below Agavey?—Certainly not more than four pence per cubic yard. Of course that includes thoroughly ponding and sodding over. It includes also sluices.

The Commission adjourned.

March 13, 1887.  
Mr. Witham  
O'Neil.

### THIRTY-FOURTH DAY—MONDAY, MARCH 21st, 1887.

The Commission met at 33, Abingdon-street to prepare a Report.

March 21, 1887

### THIRTY-FIFTH DAY—TUESDAY, MARCH 22nd, 1887.

33, Abingdon-street. Draft Report further considered.

March 22, 1887.

### THIRTY-SIXTH DAY—WEDNESDAY, MARCH 23rd, 1887.

The Commission met at 33, Abingdon-street, London.

March 23, 1887.

Present:—Sir James Allport (Chairman); James Abernethy, Esq., J. W. Barry, Esq., and J. T. Pim, Esq.

Mr. W. H. WHEELER, C.E., called in and examined.

5771. The Chairman.—I think you are a civil engineer practising at Boston, Lincolnshire?—Yes.

5772. You are a member of the Institute of Civil Engineers?—Yes.

5773. And you have had considerable experience in drainage works in the Fen districts?—Yes, I have.

5774. In the four counties of Cambridge, Lincoln, Norfolk, and Huntingdon?—Yes.

5775. I believe you are well acquainted with the constitution of the various drainage boards in the counties I have named?—Yes.

5776. Will you state to us how they are constituted?—I will take the River Witham as an example, which includes a drainage area of 127,793 acres altogether. That is divided into six districts and each of those districts elect their own representatives varying in number according to the area of the district. Then the District Commissioners elect representatives on a central Board called the Witham Drainage Board, and the Witham Drainage Board has the management of all the large drains—that is the River Witham and the larger drainage works—and the District Commissioners have the management of the drains of their own district.

5777. Under the supervision of the Central Board?—No; only in so far as it interferes with the arterial drainage.

5778. The arterial drainage is under the super-

vision of a central board for the whole six districts, as I understood?—Yes.

5779. And does the central board consist of members from each of those six districts?—Yes.

5780. Do all the members of each district board constitute the central board?—No.

5781. The district boards elect members to represent each separate district on the central board?—Yes. Perhaps it would make it plainer if you would allow me to read to you an extract from a paper, which I contributed to the Royal Agricultural Society, on River Conservancy, in which I explain how these boards are constituted:—

“To take an example, the Fen Acts relating to the river Witham extend over a length of about thirty miles between the towns of Lincoln and Boston. The fen land between these points is divided into six districts, each having its own Commission for the management of the interior drainage works, the number of members being regulated by the number of parishes in each district, each parish electing one representative. These Commissioners elect from amongst themselves members to represent them on the Board of General Commissioners, which consists of thirty-three members, thirty-one being furnished by the districts, and the remainder by the towns of Lincoln and Boston. The General Commission has the control of the river Witham and its banks, and certain main drains in the district, and power to lay taxes for the works necessary to maintain them in efficient condition. This organization has, during a long series of years, proved itself thoroughly efficient so far as it goes.”

Mr. W. H.  
Wheeler, C.E.

March 25, 1895.  
 Mr. W. H.  
 Whelan, &c.

5782. You say for many years; how many years has that mode been in operation?—A hundred and twenty years.

5783. Mr. Pies.—You say the towns of Lincoln and Boston send representatives?—The Mayor of each town is on the board.

5784. *Ex-officio*?—Yes.

5785. Do they contribute towards the cost of the work?—No; they are not taxed in any way, the taxation is on the land. Then, I may add further, that three or four years ago the whole of the drainage districts in our neighbourhood draining into the river Witham combined together and obtained an Act of Parliament for improving the river below Boston, by what is termed the Outfall Board. There are the Witham, the Black Sluice, and the Fourth District—three large districts—draining into the Witham, and they, with the Harbour Trust, formed a joint conservancy board for the management of the outfall of the river, and all the districts contributed 1s. an acre. The town of Boston contributed a lump sum of £10,000 towards the works, and those works are now completed.

5786. The Chairman.—What is the constitution of the Board for the future management and maintenance of the works?—For the Witham River as a Drainage District, it is elected from the sub-districts, but to the Outfall Board each Drainage Board sends as many members. The town of Boston sends three, the Witham District sends seven, and Black Sluice five.

5787. Is it a periodical election?—Yes, every three years.

5788. Mr. Barry.—What is the drainage area of the River Witham?—1,563 square miles.

5789. Is there any contribution from any other source except the land benefited by the drainage works?—No.

5790. Is there no general rate over any other land in the drainage area?—No—only the land drained.

5791. How much approximately is the total tax?—It varies according to the districts from 3s. 6d. to 1s. per annum. The average is 3s. 8d. That is for the main drainage works. I do not know what the interior drainage rates are, because they are more in the nature of tenants' taxes for keeping up small drains in the district and several pumping engines.

5792. Is that the contribution to the general funds?—Yes; and then there is 1s. an acre in addition for the outfall tax.

5793. Is that a varying amount?—It can vary, but is generally runs about that. Of course there is a limit.

5794. Is that tax struck once a year or twice a year?—Once a year.

5795. Mr. Pies.—Why does the town of Boston contribute £10,000?—Because of the navigation. They are interested in that.

5796. Was it subject to flooding at all?—No. The town previously to that had done all the work of the improvement of the river. The town acting as harbour commissioners had spent £50,000 or £70,000 on the river previously, and that is why they only contributed £10,000 then. The drainage interest had spent nothing on the lower part of the river previously.

5797. Mr. Barry.—Will you describe why the division into districts takes place in the rating process?—Because each district manages its own affairs. As a rule they have their own pumping engines and their own interior works to themselves.

5798. From this paper you have given me ["History of the Fens of Lancashire"] it appears that the taxes refer to the different districts apart from the contribution?—Those are the contributions to the Witham; but the reason why it varies is that some districts are much lower than others and receive greater benefits.

5799. It is supposed to be in proportion to the lands received?—It was so originally.

5800. Is that fixed by Act of Parliament?—Yes. I think you will find the Act is given there.

5801. I see the tax varies from 1s. an acre to 5s. 6d. per acre?—Yes. If you come to add the interior tax, in some of the districts the tax is as much as 18s. and £1 an acre. That is in some of the districts where they have had leeches of banks and other expensive works. In North Level, which is in the southern part of Lincolnshire, the general tax is about 10s. an acre.

5802. The Chairman.—Does that tax fall on the landowner or occupier?—The tax for general works on the landowner. For the interior works generally on the tenant.

5803. And the maintenance on the tenant?—Yes. What you may call the arterial drainage taxes—the main drainage taxes—are considered landlord's taxes, and the interior taxes—the minor works—as tenants' taxes. That is generally the arrangement, but the tax is on the land, not on the individual tenant.

5804. The occupier, whoever he may be, for the time being a tenant for the maintenance of interior works?—Yes. The other districts in the Witham are the Fourth District, which contains 63,418 acres, and the Black Sluice District, which contains 64,854. These are the large main drains of the North Lincolnshire fens.

5805. Are there beyond the 127,000 acres?—Yes, the 127,793 acres in Witham district. Then on the River Welland there is the Deeping Fen District. That contains 30,000 acres. That is all very low land indeed—peat land principally—and that drains by the River Welland. That is drained entirely by steam power.

5806. Mr. Barry.—Does the river Welland pass through that fen in an embanked course?—No; it is connected by a large drain called the Verminia, and that drains into the Welland.

5807. Then the pumping takes place into the Verminia?—Yes.

5808. Mr. Abernethy.—All that part of the country is considerably under the level of the river?—Yes, that would be all under water in high water.

5809. Mr. Barry.—Where does the jurisdiction of the Outfall Commissioners on the river Witham begin?—The Witham Commissioners begin at Boston, and go up to Lincoln.

5810. Are the works of the Outfall Commissioners outside the original district of the river Witham?—Yes; it is an entirely new board.

5811. And they pass into country which is outside their district?—Yes. They came down to Boston before, and now the Outfall Commissioners go from Boston to the sea. The Outfall Board consists of the Harbour Commissioners as well as the Drainage Commissioners. It is a joint trust drainage and navigation.

5812. Mr. Abernethy.—Will you describe the method generally adopted in these drainage works?—It is principally by large main cuts with sluices at the end to prevent the tide backing up. The river Witham, for instance, has been drained entirely in that way. A sluice is put across the Witham at Boston, which is self-acting. As soon as the water inside rises higher than the water outside the doors open and let the water run out, and when the tide comes up it shuts the doors. That is the main arterial drain, and it is embanked all the way between Boston and Lincoln. Then there are lateral drains running up which are also embanked, and the greater part of those pump their water into the Witham.

5813. It is generally by embankment?—Always by embankment.

5814. In forming these embankments there is generally wash land left at the edge of the river?—There used to be in olden days. Both on the Welland and on the Nene there were very large wash lands. We have none on the Witham; but I think there are 5,000 acres on the Welland and a large area on the Nene and the Ouse—nearly as much.

5815. The Chairman.—Who? you say large areas

what distance are these embankments from the main drains?—It varies in width. There is sometimes as much as half a mile between the river and the bank. Both on the Ouse, Nene, and Welland there are waste lands, but none on the Witham.

5816. Why?—I do not know why exactly. I do not think they would be left now. It was with the idea of collecting the water in floods, but it has been of no real service for that purpose.

5817. Mr. Barry.—In the nature of reservoirs?—These wash lands in summer grow very good grass, and in winter time they are generally under water, but unfortunately during the wet seasons we had a few seasons ago, they were under water in summer as well as winter, and all the crops were spoilt. After the wash lands are once filled with water they are no use as reservoirs.

5818. The Chairman.—Was that in consequence of the extent of the wash land, because you say it may be half a mile wide?—Yes.

5819. Would you suggest that they should be put close to the river?—I do not think they have been of any service really in assisting the drainage.

5820. Mr. Abernethy.—Have the main drains sufficient sectional area to carry off flood without embankments?—No. On the Ouse certainly the river is not large enough to carry off the water and that is the cause of flooding.

5821. You say the arterial drain is outcropped all the way up to Lincoln?—That is an instance where there is no wash land, and the Witham is sufficient to carry off the flood with the improved outfall. When wash land is once filled it is no more use for drainage purposes.

5822. Are these embankments on the margin of the arterial drain?—On the Witham they are close to the river—just a small fall.

5823. With regard to the Black Sluice?—The Black Sluice is not embanked, because that is protected by dams at the end. These are embankments but they are simply spoils that has been thrown out of the drains, and the water there is kept out by the sluice at the end of it, and there is no fear of flooding. If you take the Ouse, the water runs up to the Hemminge sluice thirty or forty miles above Lynn and the tide has a free course. These the river is embanked the whole way up.

5824. That is a tidal river in fact?—Yes, and the same up the Welland. The Welland has a free course all the way up, and it is embanked.

5825. I understand that the embankments which are formed on the main arterial drains up to Lincoln are formed now the edge of the river?—Yes, close to. There is fifty or sixty feet from the river to the bank. In the same way up the Ouse from Lynn to Denver sluice there is no elsewhere except a shore varying in width from fifty to one hundred feet, and then when you get above Denver sluice there are large wash lands.

5826. Up to Denver sluice there are embankments formed some distance back, fifty or sixty feet?—The wash land is a great deal more than that.

5827. Mr. Pies.—What height are the banks?—That varies—ten to fifteen feet. It depends on the level of the land. They are about four feet above the highest tides I should think, speaking generally, in the three rivers, the Nene, Welland, and Ouse.

5828. Mr. Abernethy.—The peculiarity here is that these are tidal rivers?—Yes.

5829. And there is a rise and fall of tide of about twenty-five feet?—Yes, in the estuary.

5830. Are you acquainted with the embankments on these rivers above the tidal influence?—Yes.

5831. How are the low lying lands there protected from land floods?—They are all embanked unless they have sluices. The lateral drains have sluices and protect the drains in that way. Where there are no sluices they are embanked.

5832. In fact the main arterial drain or river beyond the tidal influence is embanked?—Yes.

5833. And are the banks in that case formed on the margin of the river or some distance from it?—Near the margin of the river.

5834. How far from it?—It varies. It has simply a short margin in front—perhaps a chain wide, or something of that kind. In some places, where wide flood lands have been left, they have been embanked and enclosed.

5835. Can you give us the cost per mile of these embankments, say to Huntingdon?—No, I cannot. I can give you the cost where marshes have been enclosed in the lower part of the river. The upper banks have been put up so many years that it is impossible to say the cost, but from £15 to £20 an acre is what they have cost where lands have been enclosed from the tide.

5836. Setting aside the tide—can you give us any instance above the tidal influence?—I could not; because they have been put up so many years there.

5837. Mr. Barry.—How much a cubic yard does embankment cost now?—About 6d.

5838. Does that include sodding it and completing it in all ways?—Hardly that; the sodding would cost a little more. There would be the sodding in addition. A great deal depends on the height and the distance the stuff has to be run; but taking it approximately I should say 6d. a yard.

5839. Mr. Abernethy.—In a case where a drain is formed from a back drain and passes up to the embankment?—Then it would not cost £15 or £20 an acre, but it would be only a small bank there. These banks are forty to fifty feet wide, that we put up for enclosing from the tide on the salt marshes.

5840. Mr. Barry.—In fact they are sea defences to some extent?—Yes, they are the only banks I know of recent construction. The others have been up for 200 or 300 years.

5841. The better grade would be the price per cubic yard—you say about 6d.?—Yes; I should think that would be about a fair average.

5842. Mr. Abernethy.—What regulations are formed for the conservation of these banks?—Where there has been no special Act of Parliament obtained they are under the jurisdiction of the Court of Sewers, which is a very large body, first created in the reign of Henry VIII., and consists of Commissioners nominated by the Crown. All over Lincolnshire and in the Fen Country there is the Court of Sewers, and they take charge of all sea banks and all other banks except where there has been a special Act of Parliament obtained, separating the district from them. They take charge both of the banks and the main drains; but the greater part now are under separate Acts of Parliament. I think altogether there are 2,000 Acts of Parliament applying to the Fen Districts.

5843. Mr. Barry.—How does the Court of Sewers find funds for works?—By levying rates.

5844. Do they levy rates on the riparian owners or on the whole district?—On the whole district; they call upon each parish to contribute. They have what they call dyke-motes or tolls.

5845. Is the proportion fixed by Act of Parliament or by custom?—By custom.

5846. The proportion which each parish is to contribute?—Yes; I believe practically it is minimal.

5847. I think I am right in saying that the Court of Sewers have very large powers of entry on land for the purpose of doing works?—Yes; very arbitrary powers altogether. They are a very large body, consisting of people owning a certain amount of property all over the county. I think there is a fresh nomination every ten years.

5848. Is there a surveyor to the Court of Sewers?—Yes.

5849. Is it his business to keep a surveillance over the banks which are not under private Acts of Parliament?—Yes: all the sea banks, and all the main and interior drains that are not governed by private Act

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of Parliament he has the superintendence of. He reports to the Court what works he considers necessary and then the Court calls on the dyke-reeve of that particular parish to do the work.

5850. Has he a staff of inspectors under him?—No; there are several surveyors appointed. The Court of Sewers is split up into different districts for different parts of the county, and each court sits by itself, and has its own clerk and own officers, and I believe the Commissioners have power to come down to any court and sit. It is practically one whole commission, though split up into a number of districts.

5851. Mr. Abernethy.—Is there any practical difficulty found in maintaining those banks in good order?—No.

5852. Are there any penalties imposed for injuring the banks?—Yes, severe penalties.

5853. Mr. Pies.—How are the penalties enforced?—If the dyke-reeves do not do the work the court have power to do it and charge them with it.

5854. The Chairman.—What is the nature of the damage that have arisen—for instance, wilful damage?—I do not know that any cases of wilful damage have occurred, but the damage has been from breach by the sea.

5855. Do the cattle do much damage?—Not a great deal; what they do is repaired every year.

5856. Do you find much damage arising from rabbits or rats?—Yes; there is a good deal of trouble with rabbits. Anybody may shoot rabbits on a sea bank, or hares.

5857. Mr. Barry.—Supposing there is a penalty attached to wilful damage, how is that penalty recovered?—I cannot answer that question. I do not know. At one time if a man was caught doing wilful damage he was staked in the breach he made and buried there; but that law has been repealed.

5858. The Chairman.—I suppose in the ordinary course there would be a summons before the magistrates?—Yes, no doubt.

5859. That would be the practice?—I take it that would be the case. I do not remember a case occurring at all.

5860. Mr. Barry.—Can you give us any idea what the cost of maintaining banks is above the tidal influence per mile per annum?—I am afraid I cannot. It is not kept separately. It is mixed up with so many other things.

5861. Do you find it considerable where there is no tide?—Very little indeed. The bank once properly made, where there is no tide there is nothing to damage it, that is, if it is well made first. The difficulty is where it has been a peat bank not properly made, and the peat wears away and lets the water through. The great difficulty has been up the river Glen, which is a small river discharging into the river Welland. The bed is above the level of the land, and the banks are made of peat. The water sometimes gets to nearly the top of the banks, and there have been breaches there. There have been one or two up the Witham; but, as a rule, there are very few breaches of the banks, taking the number of miles we have throughout the county.

5862. What do you find the best materials for making banks?—Clay, if we can get it; but we have to take what we can get. A great many banks are made from silt and sand from the foreshore.

5863. Do you find that the clay cracks?—Not if it is well covered with sods, but the difficulty is the first few years till the sods are well grown, and then there is very little difficulty after that, if the smallest amount of attention is paid to them.

5864. Mr. Abernethy.—In that the ordinary soil would form a bank?—Yes; we have banks made of almost pure sand, and of peat and of clay. The peat banks are made with a peddled trench in the centre.

5865. So the case you mention of the river Glen, where the surface level is considerably above the level of the land where you have those peat banks, are they

effective in keeping the land from floods?—Yes, the outfall of the Glen was very bad indeed, a few years ago, but they have made a new sluice, and since that the water gets away better. The Deeping Fen Commissioners had the arrangement of the banks on one side, and the Black Sluice Commissioners on the opposite side of the river, and when a flood came each Board sent their men on the banks who had to walk up and down day and night to see if there was the least appearance of a breach in order that they might stop it, because it is the first beginning that is the easier stopped. If a breach occurred on one side they used to throw up their hats on the other side and go home, because they knew they were perfectly safe.

5866. That arose from insufficient outlet in that case?—Yes, the river has gradually silted and filled up.

5867. Have you been in Holland?—Yes, I have just lately come back from there.

5868. The Chairman.—Have you the number of miles of embankment for these three districts, the Witham, the Fourth, and the Black Sluice?—I do not remember.

5869. Will you furnish it to us?—Yes.

5870. Mr. Abernethy.—And all the way up to Lincoln?—Yes.

5871. The town of Huntingdon is sometimes under water?—Yes; frequently. A very small ruin indeed floods all that district.

5872. And does the town of Huntingdon contribute at all to the drainage?—No.

5873. Are you aware that it is proposed that Huntingdon should contribute, and that all the towns subject to flooding should contribute?—Yes; and a very fair thing too—Lincoln is frequently flooded, and the streets and houses have been under water.

5874. If your works are executed to relieve them from flood, do you not think it just they should contribute towards the taxes?—I think so. They contribute a great deal of water to the river, and receive a great deal of benefit from the river, and I think it only fair they should contribute towards the maintenance of the river.

5875. Could you tell us whether from £3 to £4 per mile per annum strikes you as a reasonable sum for maintaining banks above the influence of the tide?—It depends upon the construction of the banks a great deal. I do not think we can lay down any general rule.

5876. We have had evidence that that is the cost in certain places in Ireland?—I should say the banks do not cost so much as that in our district.

5877. They do not cost so much?—No, certainly not, I should think. I could not give any figures, because the accounts are not kept separately.

5878. Could you give us a general idea?—No, there are no separate accounts kept of the cost of the banks.

5879. Mr. Abernethy.—Your impression is that it is less than £4 per mile?—Yes, except the river Glen—which costs a large sum for maintenance—that is an exceptional case.

5880. Mr. Barry.—Do you find the bed of the river rise from silt up?—Yes, and from the accumulation of weeds.

5881. Do you have to undertake works from time to time to deepen the bed of the river?—I am alluding all this time to the river above the tidal?—Yes; I will give you an instance of what I saw being done a few weeks ago in the Vorneth drain, which takes the drainage from the Deeping Fen. Hitherto they have cut the weeds by hand, and they have had a kind of rakes drawn by horses; but lately, within the last year or so, they have had a machine at work, in which there is a large barge and a portable engine with two drums and a wire rope running a mile each way. Then rigged out from either end there is a frame with a "hedgehog" with a number of spades to it. The barges run up and down the drum, the drum revolves, and the spades keep catching



March 15, 1885.  
Mr. W. H.  
Wheeler, Ch.

up the dirt and the weeds in the bottom, and breaking it up into mud, and that is carried away by the current of the drain, and ultimately by the river. They have found it very effective. They have deepened the drain in some places two feet by that means, and cleared out the woods.

5831. Sir James Alcock.—You are not troubled with rock in any part?—No.

5832. In the Ouse is not there some part of it—a few miles above Lynn—where they got the limestone rock?—No, it is all clay and peat. I know, because two or three years ago I made a report upon that river.

5833. Is there any in the Nene?—No, that is nearly all silt.

5834. Above Wharfedale I mean?—When you get above Peterborough?

5835. I do not mean as high as Peterborough?—I think not, there may be some few hard beds.

5836. Mr. Abernethy.—Are they not dredging very often on the great arterial drain up to Huntingdon?—Yes, in all that district they do a good deal of dredging.

5837. That is also soft material?—Yes, but I believe the machine I have been speaking about is better than any dredging machine, because the stuff flows away naturally. The principle is that the soil is so broken up that it becomes mud, and they run at such a slow rate that they do not do more than the current can carry away in suspension.

5838. The current there is very sluggish, is not it?—Yes, about a mile and a half an hour, and that is only when pumping is going on.

5839. You said you had been in Holland?—Yes, and that led me to write to you. I had been over Lake Haarlem, where a lake of over 40,000 acres in extent has been now turned into a prosperous country with 10,000 or 12,000 inhabitants. That has been done entirely by the Government of the country—by a commission appointed for the purpose. I found that it had not paid the Government for doing it—it had cost about £30,000; but there was this tract of valuable land with schools and houses and everything on it—in fact a complete community—where formerly there was the bed of the lake.

5840. Mr. Barry.—Did you say it only cost £30,000?—That was after the sale of the land—over and above the sale of the land.

5841. That is the best?—Yes.

5842. Do you know what the total cost was?—I think I have it in my paper here. The area is 41,642 acres, the total cost of the work was £781,453, and the net cost after the sale of the lands £36,042.

5843. Sir James Alcock.—And you have told us that there are about 12,000 inhabitants there now?—From 15,000 to 13,000.

5844. Mr. Barry.—Do you know what the land sold for?—About £16 an acre—£16 to £20—varying according to its position. I think that is about the average.

5845. Was there any peat?—Yes.

5846. Did that £16 an acre include the peat?—That was the average over the whole. A great deal of it is sand—the bulk of the reclamation. But I can give you some instances of peat land. I have picked out here three peat reclamations. There is one called the Prince Pool Estate, in North Brabant. That contained 1,500 acres. It was reclaimed in 1844, and the peat there was from one foot eight to five feet. It rested on sand. It was reclaimed by cutting ditches sixteen feet wide by eight feet, and eighty feet apart. The draining cost £2 10s. to £30. an acre. It grows oats, clover, rye, mangels, potatoes, and grass. There are eight homesteads upon it with 100 cows, 50 calves, 600 sheep, 25 horses, and 100 labourers earning 1s. 8d. a day, all that was previously entirely peat. Then on the Helraen Ven, also in North Brabant, a company had been formed and they had reclaimed 2,550 acres with a capital of £20,000. They were dividing from 5 to 10 per cent. dividend formerly, but latterly

only 3 per cent., but they set aside 6 to 7 per cent. every year. There were 400 acres under cultivation. There is a population of 100, and between 200 and 300 working on the estate, while in the summer there are from 700 to 800 employed. That also is peat on sand. The peat is used for fuel, and then the land is drained and cultivated. There the reclamation cost £20 per acre, and the crops which the land now produces are potatoes, oats, wheat, clover, flax, &c. There are from 400 to 500 sheep on it, and the people do a great deal of market gardening on the reclaimed land. The men earn £35 a year and the lady £25. There is a cottage and one acre of land provided by the company for 43 a year, and the labourers are allowed to purchase their cottages by annual payments if they like. There is a cottage and 10 acres of land given rent free for 10 years on condition that the land is reclaimed. The workmen there are much better off than on the surrounding land. Then there was another estate called the Wilhelms Fokker, the extent of which was 5,000 acres. There was no pumping required. The cost of maintaining the dykes, &c., was from 13s. to 17s. an acre. The dykes are the embankments, and that will perhaps answer the question which you put to me just now. There are 300 people employed there with 20 acres to a man, and the wages are 12s. to 15s. a week, and the cottages are let at 1s. 8d. a week.

5847. Are you acquainted with the reclamations that have taken place in connexion with the Amsterdam canal and the river Y?—Yes, I have been over part of them.

5848. Do you happen to know how much land was enclosed there?—I do not remember. I have not the particulars of them.

5849. It was a very large tract, I believe?—Oh, yes, a very large tract, indeed.

5850. Sir James Alcock.—Approximately, was you any what quantity of land was reclaimed by that Amsterdam reclamation?—No, I cannot remember. There is a description of it in the Transactions of the Institute, I think. The reason I wrote to Mr. Abernethy was that it occurred to me that there are large quantities of waste land in Ireland, which if dealt with in the same way as the Government of Holland have dealt with this would not only employ the surplus population, but it would be the means of colonizing at home, instead of sending the population out of the country, as has been proposed. It is utterly impossible for any private individual to undertake those works in the face of the bad times. All those works in the Fens have been undertaken by private enterprise in good times, but certainly with the present price of land nobody would do it. None of the embankments that have taken place round the coast in Lincolnshire would pay now. The lands reclaimed used to fetch from 40s. to 50s. an acre, but now they are glad to put up with 20s. to 30s., and sometimes they cannot let the land even at that. Guy's Hospital enclosed a large quantity of land, and they have a great deal of it on their hands now and cannot let it.

5851. Mr. Pim.—Who are the electors of those district boards?—The occupiers.

5852. Those who pay the drainage rates?—Yes.

5853. Are they occupying farmers?—Yes.

5854. Then it is not the landlord, but the farmer who is in occupation who pays the rate?—Yes.

5855. Do they vote by a cumulative vote?—I mean in proportion to the value of their holdings?—That is according to the constitution of the Act—I think they do in some cases.

5856. The Cheshams.—That has been abandoned, I think, of late years?—Yes.

5857. The cumulative vote has not appeared in any private Act lately?—I do not think it has—I do not remember.

5858. Mr. Barry.—Just let us go back upon that Haarlem Meer for a moment. The total cost would

March 27, 1887. come out to nearly £18 an acre—would it not?—  
 £16 5s  
 Mr. W. H. 5910. Then you have to add on the £86,000?—  
 Wheeler, C.E. Yes.  
 5911. That would bring it up to nearly £18 an  
 acre?—Yes, somewhere about that.  
 5912. Do you know at all the cost of pumping, and  
 the maintenance per acre of Hearle's Meer?—Yes,  
 I think I could give you that—I have not it with  
 me.

5913. Perhaps you will kindly send it to the  
 Secretary?—I will.

5914. I think the whole of the Haackon Meer is  
 dependent on pumps—is it not?—Yes; in winter  
 time they have to pump. They pump about three  
 months in the year. Any rainfall that comes in the  
 summer passes away generally by evaporation. Every-  
 thing that is not evaporated must be pumped up.  
 There is a lift of about fifteen feet.

Draft Report further considered.

March 28, 1887.

### THIRTY-SEVENTH DAY—THURSDAY, MARCH 24TH, 1887.

32, Abingdon-street. Draft Report further considered.

March 29, 1887.

### THIRTY-EIGHTH DAY—TUESDAY, MARCH 29TH, 1887.

32, Abingdon-street. Draft Report further considered.

March 30, 1887.

### THIRTY-NINTH DAY—WEDNESDAY, MARCH 30TH, 1887.

32, Abingdon-street. Draft Report further considered.

March 31, 1887.

### FORTIETH DAY—THURSDAY, MARCH 31ST, 1887.

32, Abingdon-street. Draft Report further considered.

April 1, 1887.

### FORTY-FIRST DAY—FRIDAY, APRIL 1ST, 1887.

32, Abingdon-street. Draft Report further considered.

April 2, 1887.

### FORTY-SECOND DAY—TUESDAY, APRIL 5TH, 1887.

32, Abingdon-street. Draft Report further considered.

April 3, 1887.

### FORTY-THIRD DAY—WEDNESDAY, APRIL 6TH, 1887.

32, Abingdon-street. First Report settled.

# APPENDIX.

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## GENERAL ABSTRACT OF DRAINAGE DISTRICTS.

A.—DISTRICTS CARRIED OUT UNDER THE 5TH AND 6TH VIC., CAP. 89.

B.—DO. DO. 26TH AND 27TH VIC., CAP. 88.

A.—ARTERIAL DRAINAGE ACTS (5TH &amp; 6TH VIC., CAP. 89, AND 9 VIC. CAP. 6).

There were 129 Drainage Districts carried out under the above Acts, the works of which were executed under the directions of the Board of Public Works at a total cost of, £ s. d. 2,390,512 12 4

From this Expenditure is to be deducted—

	£	s.	d.
County Works, . . . . .	152,180	12	8
Navigations, . . . . .	358,849	8	5
MSOs, . . . . .	37,227	7	9
	548,257	18	10

Total expenditure on Drainage and Reclamations, .

1,842,254 12 6

From this is to be deducted the expenditure on Obnoxious Reclamation for which there is no improved value given, .

11,702 4 7

Also the expenditure on Sloughmolden District, the Award being abandoned, .

2,512 12 11

15,916 17 6

Total expenditure on 119 Districts, .

£1,827,068 16 0

The total area of land drained or improved and reclaimed, deducting 53a. 1r. 3c. connected with mills, 265,591a. 0r. 11p.

The annual improved value thereof, £74,502 7s. 2d.

## B.—THE DRAINAGE AND IMPROVEMENT OF LANDS ACT (IRELAND)

26 AND 27 VIC., CAP. 88, &amp;c., &amp;c.

There are 42 Districts in which the works have been carried out by Drainage Boards, and brought to Award under the above Acts

The total area of land drained or improved, . . . . .	78,838a. 3n. 0r.
The increase in the original value, . . . . .	£24,225 8 2
The average improved value per acre, . . . . .	0 6 2
The outlay, including interest, . . . . .	594,598 10 8
The average cost per acre, . . . . .	6 8 1
The average return per cent. per annum, . . . . .	4 16 0

The Districts under the above Acts respectively have been divided into four classes, as follows:—

1st Class, where the expenditure was over £70,000.

2nd Class, where the expenditure was over £30,000 and under £70,000.

3rd Class, where the expenditure was over £5,000 and under £30,000.

4th Class, where the expenditure was under £5,000.

A.—ABSTRACT OF THE EXPENDITURE ON 119 DRAINAGE DISTRICTS, the Works of which were carried out by the BOARD OF PUBLIC WORKS, under Acts 5th and 6th Vic., cap. 89; and 9th Vic., a. 4, do., as classified in the accompanying Schedules.

Class	EXPENDITURE.	Area Drained and Improved.	IMPROVED VALUE.		GROSS OUTLAY.			Average Cost per acre.	Average Return per cent. per annum.
			Per acre.	Average per acre.	On Works.	Interest.	Total.		
1	Over £70,000, . . . . .	62,048 0 20	31,727 5 12	0 8 11	481,352 8 4	109,994 12 11	591,346 9 5	8 7 12	5 20 2
2	Over £30,000 and under £70,000, . . . . .	140,042 0 1	31,773 8 0	0 6 12	565,227 2 9	129,052 1 4	694,279 3 3	7 30 5	5 2 8
3	Over £5,000 and under £30,000, . . . . .	37,312 3 21	12,434 12 4	0 5 12	384,372 18 8	81,512 10 7	465,884 18 5	5 4 8	5 27 11
4	Under £5,000, . . . . .	31,278 1 1	10,248 7 9	0 6 8	310,327 5 10	29,119 0 8	339,446 5 8	5 20 8	6 8 4
	Total, . . . . .	270,680 0 22	76,202 7 2	0 5 7	1,691,281 5 8	349,675 8 5	2,040,956 14 3	6 37 1	4 1 7

\* Of which £204,716 is 4d. was a free grant.

B.—ABSTRACT OF THE EXPENDITURE OF 42 DRAINAGE DISTRICTS, the Works of which were carried out by DRAINAGE BOARDS, under the "Drainage and Improvement of Lands Act (Ireland), 1863," Acts 26th and 27th Vic., cap. 88, &amp;c., as classified in the accompanying Schedules.

Class	EXPENDITURE.	Area Drained and Improved.	IMPROVED VALUE.		OUTLAY.			Average Cost per acre.	Average Return per cent. per annum.
			Per acre.	Average per acre.	On Works.	Interest.	Total.		
1	Over £70,000, . . . . .	20,048 0 20	8,728 2 7	0 2 7	144,702 4 4	33,125 16 8	177,827 11 2	7 30 4	5 11 6
2	Over £30,000 and under £70,000, . . . . .	1,232 0 4	2,214 12 9	0 7 0	22,227 7 2	21,734 9 0	43,961 6 2	36 11 3	2 21 0
3	Over £5,000 and under £30,000, . . . . .	31,232 3 4	12,578 12 2	0 5 7	320,444 8 4	34,078 12 5	354,522 10 9	5 12 9	5 17 11
4	Under £5,000, . . . . .	12,078 3 20	3,210 12 6	0 5 12	41,704 8 0	2,604 10 5	44,308 8 5	2 54 8	6 11 0
	Total, . . . . .	74,590 0 0	24,730 6 2	0 6 2	408,078 3 12	91,547 2 30	500,625 15 2	6 3 1	4 12 8

For list of Districts see Schedules A and B attached.

1st November, 1886

JAMES S. PENNY.







A. (Class 6.)

Agricultural Development Areas (Form de Office Vio., Clap. 82. doc., doc.)

*Let of Dividends exceed under the above Acts in which the Expenditure was under £5,000.*

[illegible]



[illegible]

B. (CLASS 1.)  
THE DRAINAGE AND IMPROVEMENT OF LAKES ACT (Ireland), 1863, Acts 25 & 27 Vic., cap. 48, &c.  
List of Drains erected under the above Acts, where the Expenditure was over £10,000.

No. of Drains	Name of Estate	County or Counties	Area of		Improved Value		Cost			Total Cost per Acre	Observations
			Acres	Ar. R. P.	Wetland and Improved Land which has been Improved	Per Acre per Acre	On Works	Interest	Total		
40	Barinagha River	Kildare	45,120	0 0 0	4,440 14 10	0 0 10	10,000 12 10	7,500 0 0	17,500 0 0	0 0 0	
10	Upper Liffey	North, Wexmouth, Longford, and Carlow	10,000	0 0 0	5,000 0 0	0 0 0	10,000 0 0	10,000 0 0	20,000 0 0	0 0 0	
		TOTAL	—	0 0 0	9,440 0 0	0 0 0	20,000 0 0	17,500 0 0	37,500 0 0	Average 0 11 0	

B. (CLASS 2.)  
List of Drains where the Expenditure was over £50,000 and under £70,000.

No. of Drains	Name of Estate	County or Counties	Area of		Improved Value		Cost			Total Cost per Acre	Observations
			Acres	Ar. R. P.	Wetland and Improved Land which has been Improved	Per Acre per Acre	On Works	Interest	Total		
40	Black Liffey	Wick and Carlow	21,000	0 0 0	4,000 0 0	0 0 0	10,000 0 0	10,000 0 0	20,000 0 0	0 0 0	
10	Black Liffey	Wick and Carlow	10,000	0 0 0	2,000 0 0	0 0 0	10,000 0 0	10,000 0 0	20,000 0 0	0 0 0	
40	Black Liffey	Wick and Carlow	10,000	0 0 0	2,000 0 0	0 0 0	10,000 0 0	10,000 0 0	20,000 0 0	0 0 0	
		TOTAL	—	0 0 0	6,000 0 0	0 0 0	20,000 0 0	20,000 0 0	40,000 0 0	Average 0 11 0	





## ARTERIAL DRAINAGE—MEMORANDUM by SIR JOHN BALL GREENE, C.B.

The area of Ireland may be set down as follows:—

	Statute acres
Arable and pasture, . . . .	10,367,885
Woods and plantations, . . . .	320,540
Rivers and lakes, . . . .	621,744
Bog, moor, and mountains, . . . .	4,697,094
Total, . . . .	15,996,459

Or the classification may be made according to elevation, as under:—

	Statute acres
Area, not exceeding 500 feet above sea level, . . . .	8,500,300
From 500 feet to . . . . .	7,500,550
" 600 " " 1,000 " " . . . . .	4,749,206
" 1,000 " " 2,000 " " . . . . .	1,093,000
Over 2,000 feet above sea level, . . . . .	13,430
Total, . . . .	15,996,459

It may be deduced from these figures that not less than one-half the entire surface of Ireland is within an elevation of 500 feet, or 100 yards, above the level of the sea, and it is clear that it would be within this range that arterial drainage works could be carried out with the greatest advantage, either for the purpose of relieving the lands in the river basins from periodical flooding, or for reducing the permanent water level to such a height that reclamation, thorough drainage, or other agricultural improvement of adjacent lands, might be effected. Lough Allen, 163 feet above the sea, may be said to be the extreme level of the Shannon, and it is between this point and Killybeg that the most destructive flooding takes place. The river Barrow drains a large district on the eastern side of Ireland, and the extensive morasses known as the Bog of Allen, and the other low-lying districts, do not exceed an elevation of 250 feet. The river Bann, Lough Neagh and the adjoining basin, are at a much lower level, and the height of the Erne at Lough Gowna, which may be said to be its source, is 214 feet.

Some of the large arterial drainage works hitherto attempted have not been as successful as could be desired. This has been caused by an endeavour to combine navigation with drainage, and the effect has been that the depth of water necessary for navigation required a level to be kept up at which the discharge of the flood water failed to relieve the injured lands to the extent desired or anticipated. This means of promoting inland navigation has been admitted to have been a failure, and now, to a great extent, unnecessary, in consequence of the facilities afforded for the transit of goods and agricultural productions by the development of railway communication. In future projects of this nature, the question of navigation will become a matter for serious consideration on account of the greatly increased cost, and the injurious influence upon any efficient system of arterial drainage.

The plan to be adopted must clearly be to remove from the lower reaches of the river, in each case, such natural or artificial obstruction to the free discharge of the flood water, at a level which would permanently relieve the adjacent low-lying lands from inundation,

and permit a proper system of thorough drainage, reclamation, or other agricultural improvements to be carried out.

Over large areas, drained by the principal river systems, this would be a work of such magnitude that it is believed the increased value to be expected from the improved lands would bring in but a very inadequate return for the expenditure; and opinions have been expressed that in such extensive works of great national importance, as well as local utility, a large portion of the expenditure should be borne by the State.

It would hardly be fair to expect either the owners or occupiers to pay more for the improvements in their lands than these improvements could possibly be worth; and it would appear to be unjust to require contributions from districts in which no material improvement had been effected.

At the same time, when large areas of land are rendered more productive by arterial drainage, the towns and villages in or near the improved area would become more prosperous, where there would be better markets, better trade, and higher rents. In addition to this, to relieve such low-lying districts from the injurious influence of morasses and superfluous water, must have a very beneficial influence on the climate and the sanitary conditions of such places, rendering them more healthy, as well as more prosperous.

This view of the case would lead to the conclusion that there would be really nothing unfair in expecting the towns and villages, in the districts improved by arterial drainage, to contribute something towards the repayment of the capital expended, in addition to the amount assessed on the actually improved lands.

The extent of land subject to periodical inundation is probably not immense, comparatively, but there is a great deal of estimated land, morass, morasses, and bog, which, if a proper system of arterial drainage were carried out in the several large rivers and tributaries, followed by reclamation, thorough drainage, and other improvements, would be most valuable for the purposes of agriculture.

There are 1,697,445 acres of bog and marsh land, much of which would be capable of improvement. It is principally situated at a low level, and could not fail to be greatly benefited by the opening up of the principal rivers and their tributaries, and be of great advantage to the country.

The area and percentage of this bog and marsh in the several provinces in Ireland are as under:—

Province	Area	%
Ulster, . . . .	230,561	= 20 per cent. of area
Munster, . . . .	245,729	= 20 " "
Connaught, . . . .	355,744	= 20 " "
Down, . . . .	671,131	= 40 " "
Total, . . . .	1,697,445	= 100 per cent. of area.

The details, in counties, are given in the Agricultural Statistics for the year 1885, which has been presented to both Houses of Parliament.

J. BALL GREENE.

Dublin, November, 1886.

## A.—RIVER BARROW DRAINAGE.—MEMORANDUM by MR. RICHARD HARRARD, C.E.

## STATISTICS OF ACREAGE AND VALUATION.

The total area within the watershed line is 498,000 acres—of this there are 84,000 acres of bog and 3,000 acres of mountain, leaving arable 303,000 acres.

The valuation of the district may be taken as follows:—

	£
303,000 acres arable averaging 13s. 4d.	160,035
84,000 " bog " 6d.	3,180
3,000 " mountain " 1s.	450
	<hr/> £163,665

## Towns.

	£
Athy, . . . . .	5,000
Monasterevin, . . . . .	1,750
Partickstown, . . . . .	4,100
Mountmellick, . . . . .	5,800
Philpstown, . . . . .	1,450
Rathangan, . . . . .	1,800
Studdally, . . . . .	2,800
	<hr/> 28,700
Total, . . . . .	<hr/> £192,365

If a rate of 6d. in the £ were levied off all property contributing water to the outfall as a general public improvement rate, in addition to the rate for the improvement of land relieved from flood (for which there are many precedents in the case of other public works, as for instance those of water supply) it would amount to £3,380 annually, and this capitalised

would represent an outlay of £107,600—financial matters would then stand thus:—

Mr. Fitzgerald's estimate of the improved value of land, £10,000, this capitalised represents	£200,000
General public improvement rate of £3,380 capitalised,	107,600
Leaving to be given as a subsidy,	<hr/> £207,600
	<hr/> £300,000

or any in round numbers as a subsidy, £300,000.

This would contrast favourably with the Shannon Improvement Act, 1874, promoted by Sir M. H. Beach, in which it was proposed to give as a subsidy £150,000 or one half of the total necessary expenditure of £300,000.

Mr. Fitzgerald, however, admits that his estimate of improved value of the lands relieved from flood is a low one, and further says he believes on a more careful investigation than he was able to make with the means at his disposal, would result in the area of land relieved from flood being found to be larger than he has taken it, and this might possibly reduce the subsidy necessary to a less sum than £250,000, but it is safer to keep it at that amount.

(Signed), RICHARD HARRARD.

September 13rd, 1881.

P.S.—This proposed public improvement rate of 6d. in the £, amounting to £3,380, would represent nearly an average rate of 3d. per acre on all lands within the drainage area. This last would amount to £3,100, and be so small as to be imperceptible.

## B.—MEMORANDUM by MR. J. STEWART KINCAID.

7, Leinster-street, Dublin,  
3rd November, 1881.

To J. T. PER, Esq.

## Barrow River Drainage.

My dear Sir,—Referring to my interview with you lately, I have now the pleasure of sending you a copy of my notes on the Barrow drainage.

With reference to the location of the towns and houses in the Barrow district I will add the following details of the figures given by me in the enclosed printed paper.

You will find that the Select Committee of 1877 reported strongly in favour of leasing houses and towns for river conservancy purposes, and I therefore included them in my figures giving the valuation of all rateable property in the district, viz:—

	Valuation
About 516,000 statute acres of arable land, including all farm buildings thereon.	£123,000
About 84,000 statute acres of bog.	2,000
About 9,000 statute acres of mountain.	800
Seven towns, including Athy.	20,500
	<hr/> £126,300.

The seven towns in the district are Athy, Mountmellick, Partickstown, Studdally, Monasterevin, Philpstown, and Rathangan; these have an aggregate population of about 14,000, and the rateable value is about £20,500. A tax of 6d. in the £ on these towns would realize about £510 per annum, and is included in my total of £5,400 per annum. This tax would range from £30 per annum on Rathangan, the smallest

town, to £100 per annum on Mountmellick, and £143 on Athy, the two largest.

I do not know, however, whether the town of Athy could be properly included in the rateable area as it is situated at the proposed outfall of the district, and has probably a good natural fall for its drainage; but of this I am not fully informed.

I cannot suggest any other source of taxation to make up the deficiency, but I agree with all the other professional witnesses that £10,000 per annum is a low estimate to put on the lands for the improvement proposed to be effected, and I also think the rebuilding of all the county bridges should be put on the balances or on the counties, as in the case of certain Westford bridges, and that the Barrow navigation authorities should bear a part of the expense of any works rendered necessary by accumulations caused by their weirs at their present level at Athy; and also that all private parties who have encroached on the ancient bed of the river so as to unduly narrow its width, should be required to bear their share of the works necessary to restore it either by a direct contribution or by paying an additional tax.

After you have inspected the district I would be glad to give evidence, if permitted, as I wish particularly to call your attention to the present mode of forming drainage boards, which, I think, very defective, and needs amendment especially in the case of a large district like the Barrow.

I remain, my dear Sir,

Yours faithfully,

J. STEWART KINCAID.

## C.—RIVER BARROW DRAINAGE.—REMARKS by SIR J. BALL GREENE on Papers A and B

I have carefully read over the papers forwarded to me with reference to the Barrow Drainage, and I find that the figures given by Messrs. Howard and Kincaid are so much alike that either may be taken for the consideration of the question.

The total area of the watershed of the Barrow is 408,000 acres, including 89,000 acres of bog, and 9,000 of mountain, and the rateable valuation of the entire, including that of the towns and villages, is £218,000. Of this area 45,000 acres appear to be submerged by the overflow of the Barrow, and Mr. FitzGerald estimates that the improvement in the annual value of these lands, by the proposed drainage, would amount to £10,000.

This estimate is stated to be low, but it would probably be unsafe to rely much upon this opinion, as the value of the improvements anticipated in such estimates is seldom exceeded, and not always realised. Just now it would appear to be unwise to place an extreme value on such improvements, when feelings produce so seriously affects home agricultural production. I am aware that, in 1877, a Select Committee of the House of Lords, on a "River Conservancy Board," reported in favour of raising uplands and towns, in fact the entire watershed, for the maintenance of the outfall, and that evidence in support of this view was given by eminent authorities.\* But the fact remains, as in the Barrow district, that any improvement to be expected in the lands extends to only a little over one-tenth of the area of the watershed, lying along the rivers and tributaries, and that the remaining nine-tenths being elevated above the injurious influence of the flood water, to a height of from 1,600 to 1,900 feet at the highest points of the watershed, would not derive any advantage from the execution of such works. It is well known that irrigation is a valuable fertilizer, and when judiciously used in this way there is no reason why the water descending from the higher levels should not add much to the fertility of the upland meadows, dairy land, and pastures, which are not included within the flooded area, instead of exercising any injurious influence.

Where improvements, arising from arterial drainage of this character, are sufficient to give a fair return for the cost of their execution, it would appear that the non-profitable part of the expenditure should rather be borne by the community at large, than that any portion of it should be charged to a limited local area which had not derived any special advantage.

Were the project one for the promotion of traffic, such as inland navigation or railways, by which agricultural produce could be cheaply and expeditiously carried to better markets, the entire district might fairly be said to derive benefit, by obtaining higher prices for produce; but the Barrow Drainage project

is not of this character, and under the circumstances, as far as I am aware, there is no precedent for the proposed assessment of the whole area, nor indeed of any portion of such area beyond the lands actually improved.

Both Mr. Howard and Mr. Kincaid advocate a rate of 6d. per £ on the valuation of the entire watershed area, and I have already given my opinion, in a previous memorandum, that any such rate should be confined to the 45,000 acres of improved lands, and to the towns and villages within or adjoining that area. This contributory rate of 6d. in the £ over the entire district, without any corresponding benefit, in addition to the present local taxation of about 4s. per £, would be opposed by the occupiers, and it could not be assessed on the landowners whose interest cannot now be looked upon as more than a fixed rent-charge.

The valuation of the 45,000 acres now occasionally submerged would be about £27,000, and that of the towns and villages adjoining that area £83,000, making up £110,000, and a rate of 6d. per £ would produce an annual sum of £1,320, to which add £10,000, the estimated annual value of the improvements, and the amount will be £11,320 as a return for an expenditure estimated at £600,000.

Mr. Howard has capitalized the total income at five per cent., by which, I suppose, he means that both principal and interest would be paid off in thirty-five years, as in Land Improvement Loans from the Board of Works, and Mr. Kincaid has capitalized at four and a half per cent., repayable in forty-nine years.

Under the Land Purchase Act of last year the repayment is at the rate of four per cent. for forty-nine years, and in a work such as the Drainage of the Barrow, which may be said to be of national importance, there seems to be no reason why a higher rate of repayment should be put forward.

In this way the capitalized value would be—

£10,000 per year at four per cent. for 49 years,	£265,000
£1,320 Improved Land and Towns, do,	24,320
	£289,320

Leaving to be provided by public grant or otherwise, ...	305,320
--	---------

Total estimated cost, ... .. £594,640

I quite agree with the suggestion that the bridges and public highways in the district should be kept up at the expense of the counties in which they are situated, and it is my opinion, after the execution of the works, that the Drainage Board should have power to assess the improved lands and the towns for their maintenance.

J. BALL GREENE.

General Valuation Office,  
Dublin, November, 1885.

\* This recommendation does not appear to cover the cost of works, but only the comparatively small expense of maintenance.

## RIVER BARROW DRAINAGE DISTRICT.

The area of the watershed of the Barrow district is 408,000 acres, and the rateable valuation is £216,000.

The area proposed to be improved by artificial drainage is set down at 45,000 acres, the rateable valuation of which is £27,000, towns, £28,000; total rateable valuation, £55,000. The area of improvable land is situated between 180 and 280 feet above the sea level. It has been suggested that the assessment for the cost of the works should be distributed according to three divisions or zones, and I propose that the arrangement should be in the following order:—

The first zone to include the lands actually improved, and to bear  $\frac{1}{3}$ ths of the entire cost.

The second zone to include all lands between the improvable area and 500 feet above the sea level, and to bear  $\frac{1}{3}$ ths of the cost.

The third zone to include all lands over 500 feet elevation, and to bear  $\frac{1}{3}$ th of the cost.

The following Table, arranged on this plan, will show in a roughly approximate way, from the Ordnance Survey, the area and valuation of each zone, the proportion of the total cost, the repayable annuity at 4 per cent for forty-nine years, and the percentage rate on the rateable valuation:—

	Area.	Rateable Valuation.	Proportion of Cost.	Annuity for 49 years	Percentage Rate on Rateable Valuation.
	Acres.	£	£	£	s. d.
First Zone, . . .	45,000	50,000	23,000 (46%)	Improved Value 10,000 3,000	4 3 per £ 2 2 "
Second Zone, . . .	208,000	130,000	57,000 (26%)	3,000	0 18 "
Third Zone, . . .	165,000	36,000	27,000 (12%)	1,000	0 7 "
Total, . . .	408,000	216,000	100,000	21,000	—

If the Government should give one-half the total cost as a free grant, the Table, with the proportionate annuity, would stand thus:—

	Area.	Rateable Valuation.	Annuity for 49 Years.	Percentage Rate on Rateable Valuation.
	Acres.	£	£	s. d.
First Zone, . . .	45,000	50,000	Improved value, 10,000 400	4 0 per £ 5 2 "
Second Zone, . . .	208,000	130,000	400	0 "
Third Zone, . . .	165,000	36,000	90	0 6 "
Total, . . .	408,000	216,000	11,000	—

But this improved value of £10,400 should be looked upon as a permanent source of income. If converted into a terminable annuity for forty-nine years, it would represent an annual payment of £12,886, which would cover £323,000 of the total cost, and leave £228,000 to be provided for either by local security or public grant.

It is to be feared that any system for the differential assessment of the entire watershed, according to zones of elevation, would hardly be practicable, in consequence of the difficulty there would be in determining the exact limit of height of each zone, the properties and farms requiring to be divided by imaginary contour lines, so that the assessment might be fairly distributed.

I do not think there is much in the statement that the opening up of the Barrow and its tributaries would cause the flood water from the higher levels to descend more rapidly and accumulate in the lower basin, and

that the high lands should, in consequence, bear some portion of the cost of the undertaking.

The accumulated discharge of the flood water could amount to little until it reached the points where the deepening or widening of the river, or its tributaries, commenced; and to tax the elevated and unimproved districts for water, more rapidly accumulated in this way would be to make them pay for the removal of an evil which the execution of the works had inevitably produced.

As to climate, there can be no doubt that large accumulations of water moderate the summer temperature in the locality, but I am unable to form an opinion as to how far this moderating influence affects the temperature of the entire watershed of 660 square miles, or how much it retards the ripening of cereal crops beyond those in the immediate improvable districts.

J. BALL GERRARD.

4th February, 1837.



## MEMORANDUM ON PROPOSED IMPROVEMENTS IN THE REGULATION OF THE SHANNON, by GENERAL SANKEY, Chairman, Board of Works.

The works of navigation and discharge carried out from time to time over a long period connected with the River Shannon, have formed the subject of so many professional reports and Parliamentary Enquiries, that a few remarks will serve to bring to notice certain proposals, which if adopted might, it is thought, contribute in a serviceable manner towards freeing from inundation to a comparatively moderate outlay the lands which have suffered from such floods as that of August, 1861, the most injurious of late years, and

mitigate materially the effects of the still higher winter floods which, however apparently are held rather to benefit the country than otherwise.

The following table brings together in a compact form the most important facts connected with the river, its navigation works, discharges in floods, extent of injured lands, and other particulars necessary to a clear comprehension of the general matters connected with the river.

TABLE giving SUMMARY of the principal facts connected with the SHANNON RIVER.

—	Terms.	1st Section of River Killicolee to Killicolee.	2nd Section of River. Killicolee to Ternagherry.	3rd Section of River Ternagherry to Lough Allen.	Totals.	Remarks.
Length of River, including Loughs.	Miles.	35	45	40	120	
Do. Loughs.	Do.	Nil.	41	38	80	Lough Derg, 42½; Lough Rea, 18 miles.
Do. River only.	Do.	35	41	32	108	
Total Fall.	Feet.	47	36	35	118	
Rate of fall per mile of River (average), including the loughs.	Feet per inch.	About 1½ feet.	4 inches.	Forty 16 inches	Twenty 7 inches	
Navigation depth hitherto procured.	Feet.	7	4 4 upper portion, 1 1 lower portion.	4' 6" below Lohrin, 4' 6" above "	—	In the second section of the river where the naviga- tion depth is necessarily most important, a fact was originally laid down on the Parliamentary plans, but 7 feet was subsequently adopted.
No. of Locks and dimen- sions of chamber of each.	No. Feet.	No. 18. Width, 30 to 124 ft Length, 181 to 164 "	No. 8. Width, 40' 6" to 10' 6" Length, 120' to 57' 6"	No. 6. Width, 30' to 22' 6" Length, 130' to 40' 6"	30 Locks of various kinds and dimensions	The varying dimensions of the Locks and Cham- bers in the first and third sections, are due to the fact that these were old works left unaltered by the Shannon Commis- sioners.
Present Water and their heights above Lock Sills.	No. Feet.	Ward's cut, 4 ft.	Killicolee, 4' 6" Moyock, 4' 6" Ailmore, 7' 6"	Ternagherry, 6' to 4' Rookery, 4' Jamestown, 4'	7 weirs	
Position of Sluices and No. of Valves, each 6' by 6' in the clear.	No.	Nil.	Killicolee, 66 valves. Moyock, 40 " Ailmore, 12 "	Ternagherry, 15 valves. Rookery, 12 " Jamestown, 12 "	117 valves, each 6' by 6'	
Level to which water may rise over Lock Sills without flooding Cultures.	Feet and inches	Ward's cut, No record kept.	Killicolee, 4' 6" Moyock, 4' 6" Ailmore, 4' 6"	Ternagherry, 7' 6" Rookery, 7' 6" Jamestown, 7' 6"	—	* Clonsilla Upper Sill, † Victoria Lock "
Height of maximum winter floods above lock sills.	Do.	Ward's cut, No record kept.	Killicolee, 10' 18" Moyock, 4' 6" Ailmore, 12' 6"	Ternagherry, 6' 6" Rookery, 4' 6" Jamestown, 10' 6"	—	† Flood in 1861, 17' 12" ‡ Clonsilla Upper Sill
Area inundated before the operation of the Shan- non Commissioners.	Acres.	1,154	50,314	50,548	84,120	
Area inundated subsequent to work as executed in channels by sluice gates, locks and weirs of Major Kinsington, Gale, and Lysons.	"	1,154	26,479	4,813	32,446	Valuation at 1861.
Area of land relieved by works of the Shannon Commissioners.	"	—	1,143	4,835	28,600	
Area inundated during flood of August, 1861.	"	400	5,123	4,801	10,324	
Area inundated during high winter flood.	"	1,550	12,247	4,792	28,589	

The existence so near its source of an imposing reservoir like Lough Allen, having an extent of nearly 9,000 acres, is in itself a specially favourable circumstance so far as concerns the regulation of the flow in the river, and the presence of the numerous large bogs which succeed each other in such close succession, and having an aggregate surface of not much under 15,000 acres, not only give quite an exceptional character to the river in regard to arresting and moderating the effects of the flood wave, but so completely clear the water of sediment, that any regime which may be established by means of excavation in the river channel must retain a degree of permanency not ordinarily attainable. At one point alone, Bishop's

Islands, formed by material brought down by the River Suck, which has no bogs along its course, would, excavations once effected, possibly require to be re-dredged at a future period.

On the other hand—and herein consists the difficulty of dealing effectually with the Shannon—is the fact that at several points along its course a rise in the level of the stream of only a very few inches above the navigation depth produces extensive inundations which, as observed by Mr. Bateman, "from the same causes protract the duration of the floods by the slow and gradual manner in which the water can pass away." Omitting the old canals at the Lough Allen end, and also the two old works between Killybegs and

Limerick, which were practically left untouched, the works executed by the Shannon Commissioners between the years 1841 and 1850, produced a very marked improvement in the regulation of the river and navigation, and at the same time permanently relieved from inundation a large extent of land on both banks throughout its course.

As shown by accurate surveys, the extent of inundated land before the commencement of the works amounted to no less than 34,709\* acres between Wood's Hall and Lough Allen (the inundated ground round which is also included) whereas it has been proved conclusively that since the completion of the works only 21,500 acres have been subject to inundation in high floods. In other words, 13,209 acres were relieved of inundation by the works carried out mainly in the interests of navigation by the Shannon Commissioners. In estimating the area of land which suffered damage, the late Mr. Lyman, sitting on the part of the landlords, claimed that 3,120 acres should be included as being within the belt liable to damage from saturation, and consequently in valuing the area this amount should be added, bringing the total land liable to damage up to 24,620 acres. Were a corresponding allowance made in regard to the (pre-existing) state of things not less than 4,500 acres should be added to the 24,700 acres, raising the total to 29,200, from which it follows that in a valuation of damages, as affecting both the periods, it is right to assume that no less than 14,500 acres were practically relieved.

Mr. Bateman, in his second report, dated 7th June, 1867, estimated that to afford complete relief, excepting in cases of extreme floods, such as only occur at long intervals of time, would require an outlay of £290,605 to construct the necessary sluices in connection with the several existing weirs, and carry out a large amount of excavation in various parts of the river bed where the channel was too restricted in order to give it a carrying capacity capable of venting not less than 1,300,000 cubic feet per minute at Killaloe (the calculated maximum flood at that place being taken at 1,600,000 cubic feet per minute), and so on at each place to the source.

It may be noted in passing, that Mr. Bateman in dealing with the discharging capacity of the river below its junction with the Suir, allowed 100,000 cubic feet per minute on account of the extra volume due to the drainage of that and other tributaries which had not been dealt with.

In reference also to the question of maintaining the navigation level under his scheme Mr. Bateman observed that "from the foot of Lough Derg to the head of Lough Ree, a reduction of one foot may probably be allowed when it is expedient to discharge water in anticipation of a flood."

He moreover lays stress on the desirability of impounding as much as possible of the flood wave in Lough Allen, observing that from its 100,000 acres of catchment "the flood discharge will be from 1½ to 2 cubic feet per acre per minute, or from 150,000 to 200,000 cubic feet per minute in the gross quantity."

With the immediate object of giving effect to Mr. Bateman's scheme, somewhat modified, Act 37 & 38 Vic., cap. 60, was passed, which, had it been carried into effect, would have given as free grant £150,000, in case the owners of the inundated area were prepared to charge their properties in the aggregate to a similar amount; but the inquiry conducted by the Commissioners of Public Works (who were constituted for this purpose Commissioners under the Act) brought out the following objections, viz.:-

1st. That the charges to be thus imposed would, in a large number of cases, be equal to, or even exceed, the free-value of the affected lands, and in any case would be far in excess of their improved value, were the scheme carried out.

2nd. That while the owners of the inundated lands required the prompt removal of the early summer and autumn floods to secure their hay crops, they held it to be of equal importance that throughout the winter

months the estuaries should be flooded as necessary for improving the crop of the following season.

As no assets could be obtained under these circumstances, the objects contemplated by the Act could not even partially have been attained had not the Government subsequently decided, on a full consideration of all the facts, to construct sets of sluices in connection with the several weirs, and to execute certain of the excavation works held to be most necessary for relieving the flooded lands between Athlone and Meelick, where 8,500 acres of low-lying land were shown to suffer greatly from over-flooding.

The works decided on were very successfully carried out between the years 1850 and 1853, at a total cost of £58,757.

As with the completion of these works all capital outlay on the Shannon has for the present ceased, it may be as well here to mention that from first to last the total outlay has been £319,497 (see below), of which £280,984 has been repaid by the creation and others, leaving as a total amount of free grant £372,513: for all the works as we now find them, extending from Limerick to Lough Allen.

By Discharge General of Island Navigation, and prior to 1851.	£96,400
By purchase of the Limerick Navigation Co's Weir in 1841.	£119,431
By the Shannon Commissioners, from 1841 to 1850.	£54,867
By Commissioners of Public Works, from 1850 to 1853.	£58,757

Looking to the present enhanced rates of labour, and other circumstances needless here to advert to, it may at once be accepted that not less than £300,000, and probably more, would be required to afford the complete immunity from flood contemplated by Mr. Bateman, exclusive of the sum above shown to have been laid out on the sluices and the excavations at Meelick; it may therefore be desirable to consider whether looking to the proved beneficial results of these latter works, as shown further on, some further operations may not now with great advantage be undertaken in the same general direction.

In Mr. Bateman's report of the 7th May, 1853, he observes, as a clear proof of the beneficial effects of the works carried out by the Shannon Commissioners, that, as shown by the tables compiled by Mr. Harding from registers maintained from day to day throughout the whole interval, "the estuaries immediately above the Hamilton lock, between Meelick and Buncrath (i.e., at the point most exposed to continued inundations on the Shannon), were covered more or less by water for 120 days in the months of June, July, August, and September, during six years previous to the works (carried out by the Commissioners), and for eleven days only during the same months in nine years ending with 1850, after the works."

The best proof, however, of the continued beneficial action of the Shannon works in their several successive stages will be found in the following Table, prepared by Mr. Manning, giving a complete analysis of the number of days during which the estuaries were inundated in the different reaches of the river:—1st, for eight years before the works undertaken by the Shannon Commissioners; 2nd, for twenty-eight years subsequent to completion; 3rd, for three years, during which the lately constructed sluices, &c., have been in action.†

That the general results are most satisfactory will at once be observed on examination, but it is needless to say that a three years' average is too short a time to admit of a complete judgment. It is nevertheless not a little remarkable that whereas in the early stage of unimproved river three should have been from 1-5 to 19-4 days flooding in the four months, June to September, each year; and in the second stage from 0-26 to 3-6; there has been in the final stage no flooding at all except at the Killaloe reach where there was an average of one day. That the sluices have been well and carefully worked by Mr. Crosthwaite, the Assistant Engineer in charge, goes without saying.

\* In previous returns this has been given at 22,500 acres, but on revision of 2,500 acres has since then been discovered.

† This return, as printed, has been brought down to December 31, 1886.

## JAMESTOWN.

	8 Year's average, before Works, 1810 to 1815.	20 Year's average, after Works, 1815 to 1835.	4 Year's average, after Sluice, 1815 to 1819.
Average number of days per year when a large extent of land was flooded.	227 6	400	21 56
Average number of days per year for four months, June to September, inclusive.	24 0	1 6	0
Average number of days per year when the water was at and above the height of the August flood of 1811.	122 0	7 6	8 72
Average number of days per year for four months, June to September, inclusive.	120	20	(See note A.) 0
NOTE A.—Observe that the average number of days during the year on which the floods were higher than the flood of 1811 appears to have increased by more than three days after the completion of the Sluice. The explanation is, that the flood of 1811 was the highest recorded for a great number of years, and therefore unduly raises the average of first years.			1810, . . . 30 1811, . . . 1 1812, . . . 0 1813, . . . 5 — 41 65 Average, = 87 5

## BOOSEKEY.

	8 Year's average, before Works, 1810 to 1815.	20 Year's average, after Works, 1815 to 1835.	4 Year's average, after Sluice, 1815 to 1819.
Average number of days per year when a large extent of land was flooded.	159 6	214	26 20
Average number of days per year for four months, June to September, inclusive.	27 6	2 0	0
Average number of days per year when the water was at and above the height of the August flood of 1811.	166 0	20 7	10 20
Average number of days per year for four months, June to September, inclusive.	60	26	0

## TARMONBARRY.

	7 Year's average, before Works, 1810 to 1816.	12 Year's average, after Works, 1816 to 1828.	4 Year's average, after Sluice, 1816 to 1819.
Average number of days per year when a large extent of land was flooded.	350	28 1	10 20
Average number of days per year for four months, June to September, inclusive.	5 1	20	0
Average number of days per year when the water was at and above the height of the August flood of 1811.	19 5	6 6	6 00
Average number of days per year for four months, June to September, inclusive.	10	26	0

## ATELONE.

	8 Year's average, before Works, 1810 to 1815.	24 Year's average, after Works, 1815 to 1839.	4 Year's average, after Sluice, 1815 to 1819.
Average number of days per year when a large extent of land was flooded.	355 5	70 5	60
Average number of days per year for four months, June to September, inclusive.	44 9	1 7	0
Average number of days per year when the water was at and above the height of the August flood of 1811.	155 4	60 9	17 7
Average number of days per year for four months, June to September, inclusive.	10 5	1 6	0

## NEELICK.

	40 Year's average, before Works, 1810 to 1849.	120 Year's average, after Works, 1817 to 1839.	4 Year's average, after Sluice, 1817 to 1819.
Average number of days per year when a considerable portion of the low alluvial was flooded.	147 8	20 2	20
Average number of days per year for four months, June to September, inclusive.	4 0	6 6	0
Average number of days per year when all the alluvial were flooded.	25 4	6 0	22 00
Average number of days per year for four months, June to September, inclusive.	1 0	1 0	0

## KILLALOE.

	164 Year's average, before Works, 1812 to 1875.	20 Year's average, after Works, 1817 to 1836.	4 Year's average, after Sluice, 1817 to 1819.
Average number of days per year when all the low alluvial were flooded.	305 4	74 1	21 20
Average number of days per year for four months, June to September, inclusive.	20 4	6 6	20
Average number of days per year when all the alluvial were flooded.	107 0	25 0	(Note B.) 20 40
Average number of days per year for four months, June to September, inclusive.	20 4	2 0	20
NOTE B.—See Note A on a similar reach at Jamestown.			1810, . . . 181 1811, . . . 44 1812, . . . 20 1813, . . . 10 — 41 64 Average, = 20 22

\* No Registry from December, 1810, to March, 1811.

† No Registry from August, 1846, to August, 1852.

‡ No Registry from December, 1850, to February, 1851.

Fully recognising as I do with all professional engineers, that nothing short of the execution of a scheme equivalent to that proposed by Mr. Bateman can possibly give entire relief from inundation within the limitations stated by him, I nevertheless think that having regard to the plainly expressed wishes of the owners and occupiers of the flooded lands, to have relief from flood in the early summer and autumn, I am of opinion that by the execution of certain works in regard to which Mr. Manning and I are agreed, and also by the conferment on the Board of certain powers, to be immediately mentioned, to allow of their reining, within well defined limits the depth of water required for the navigation, a still further marked improvement may be effected. Without going so far as to guarantee instantly in future from all the injurious effects of such a flood as that of August, 1861, I think there is a fair probability of this being very nearly if not quite attained.

The works adverted to are generally those named below and the positions are sufficiently indicated in the annexed Index Map, where the lately constructed sluices, &c., are marked by red and those of the following proposed works by green lettering.

*Suggested distribution of an Expenditure of £100,000 on the Improvement of the Shannon.*

Index Map.		£	s
1	Sluice, Weir, Embankment and Guard Lock at Lough Allen.	7,200	
2	Excavation at Shannon Bridge and	2,000	
3	Excavation between Jameson and	20,000	
	Youghally, and improvement of		
4	Canal Sluice.	2,800	
	Total from Lough Allen to Athlone.	22,000	
5	Excavation at Shannon Bridge, and	75,000	
	Embankment and in the river course		
	below it, to the junction of the Grand		
6	Canal in River between Jameson	2,000	
	and Youghally.		
7	Sluice, Weir, Embankment and	3,000	
8	Excavation in River above and below	10,000	
	Killickee Weir, improvement of Bridge,		
	and other Works.		
9	Guard Lock at entrance of Limerick	600	
	Canal.		
	Total below Athlone.	40,600	
	Contingencies and Superintendence.	—	7,400
			100,000

It is needless to say that a scheme thus indicated, although mainly based on that of Mr. Bateman's, can only be given in very general terms open to modification, and would for complete elaboration need the framing of carefully prepared estimates based on special surveys; at the same time the main feature of the proposal is that the total outlay named, £100,000, shall not be exceeded.

The amount for Lough Allen is intended to provide by embankment or also by the excavation of a channel into the lake for converting this fine basin into an impounding reservoir, which could then, if run down in anticipation of a flood to two feet below present summer level (102 feet above L.W.S.T.), be made capable of storing up eight days of a continuous flood—200,000 cubic feet in volume per minute—before discharging. As this result can be attained without in any way raising the winter level of the lake above what it attains now, viz. 146 feet above L. W. S. T., its value will be self-evident as affecting *pro tanto* the value of the Shannon floods throughout its course to the sea. There can arise, moreover, no claim for compensation by riparian owners as the winter level would not be raised.

A guard lock is also provided for as this is very desirable in view of preventing from accident portions of the old canal which passes at one place through boggy ground at a high level.

Items (3) and (5) call for no remarks. Item (4) is

most essential as clearly shown by Mr. Bateman, embracing as it does the useful rectification of the river bed as it approaches and leaves Shannon Bridge, and also for widening and giving increased discharging capacity to the channel at Bishop's Island and Derryholme. It is hoped here and possibly elsewhere that by adopting wider and shallower excavations than contemplated by Mr. Bateman the work may be executed economically.

Item (5) calls for no remark, and as regards (6) it may suffice to say that this has relation chiefly to the question of dealing with the navigation depth to be immediately adverted to.

Item (7) has very special importance as by carrying out the excavations above the Killakee Sluices so as to bring the water quickly, to them, and continuing the cut sufficiently down stream, means will be given for, if necessary, lowering the level of Lough Derg as rapidly as may be found possible. Some slight change will also have to be made in the upper part of Moy's lock, which having its sill 1½ feet higher than Killakee, rules the Canal level.

At the present moment from the removal of the old embankment which formerly existed between the lock at Killakee to the pier in the lake there is during flood, as remarked by Mr. Bateman, a fall of from 10 to 12 inches between these two points and the current due to this is such as to greatly impede and even at times to stop the navigation. Were this old bank reconstructed as now proposed not only would the navigation be at once relieved, but taken with the excavation of the wide channel above adverted to, admit of the summer level of Lough Derg being kept one foot lower than has been hitherto possible. The surface of the Lough being nearly 30,000 acres every inch of rise would normally stated store over 100,000,000 cubic feet. The value of such an arrangement in averting and moderating the flood action is too obvious to need further remark.

In all probability the best method of dealing with the portion of the Killakee sluice which would be affected by the proposed excavation above and below the sluice, would be to remove some of the old piers and substitute iron girders; but this is merely a matter of detail.

Item (8), guard gate at entrance of the old Limerick Canal, a little above Castle Connell, is considered most necessary, as some very unsafe ground is passed through in one of the reaches, which for want of the work alluded to frequently gives cause for anxiety.

Coming now to the question of so dealing with the navigation depth between, at least, Lough Allen and Killakee, as to afford a further means for regulating the rise of the river more in the interests of drainage than has hitherto been possible, I would beg, in the first place, to remark that when the Shannon, and I may say the other navigations throughout Ireland, were undertaken with such sanguine anticipations, and received such general and liberal support from the State, they were considered the chief means for conveying the passengers and goods which are now almost exclusively carried by railway.

As showing the actual condition of the trade the following tables of tolls collected for the upper division of the Shannon (from Athlone to Lough Allen), and for the lower division (from Athlone to Limerick), will give the latest information on the subject at every fifth year since 1870.

*Return of tolls, &c.—*

	1875.	1875.	1875.	1875.	1875.
	£ s d.	£ s d.	£ s d.	£ s d.	£ s d.
Upper Division.	31 0 0	86 0 0	120 1 0	53 10 0	
Lower Division.	940 17 0	1,623 13 10	1,602 7 0	1,497 17 0	
	1,071 0 0	1,709 13 0	1,722 0 10	1,497 14 0	

Traffic in the year 1855 showing the character of the goods carried:—

	Upper Division	Lower Division
	Total.	Total.
Flour, . . . . .	50	3,220
Corn, . . . . .	849	3,935
Oat, . . . . .	159	4,078
Timber, . . . . .	18	2,407
Shoes, . . . . .	—	2,201
Text., . . . .	128	3,150
Fur, . . . . .	—	14,428
Skates, . . . . .	1,041	6,291
	2,406	30,180
Grand Total, . . .	41,726 Tons	

From the first of the above tables it will be observed that there is a marked difference between the traffic on the Upper and Lower Shannon, the division, though nominally given as at Athlone actually taking place at Shannon Bridge, the nearest point to the junction of the Grand Canal with the river.

For the Upper Shannon the traffic is not only quite insignificant but shows no signs of improvement, and the question naturally arises whether, looking to the much more valuable and permanent interests involved in the drainage of the inundated lands, it is any longer desirable, under the altered circumstances, that the depth of five feet from Turnmerry up to Leitrim and four and a half on to Lough Allen should be rigidly adhered to.

When it is considered what would be the effect of creating impounding capacity by lowering by one or two feet the level of the water in all the bays above Lough Rice, with an aggregate surface (excluding Lough Allen) of not less than 15,000 acres, it is needless to say that taken by itself the conferring of such powers on the Board would almost of their essence (with certain limitations as to the season of the year, &c.), most materially contribute to relief from flood throughout the whole length of the Shannon, without any serious injury to a traffic which has a mere nominal existence. Since, moreover, Lord Monck's Commission on the Navigation of Ireland has clearly, and as I venture to think most properly decided, that the Ballinacorney and Ballyconnell Canal can never, even if completed as originally intended for steam navigation, be of the slightest use for this object, and is only fitted to act as an arterial drain; it is additionally clear that the navigation of the upper Shannon may, without any impediment or hardship to the existing trade, be dealt with as of very secondary consideration.

Whether the navigation depth between Turnmerry and Kilsloe can also be subjected to modification is no doubt a matter of some difficulty to decide, notwithstanding the fact that, taken in the gross, the traffic is extremely small, and its value a bagatelle as compared with that of the drainage of the land in this portion of the river.

Looking to the fact that two such large sheets of water, Lough Ree over 17 miles, and Lough Derg close on 23 miles in length, have to be traversed, vessels with nearly all the qualities of sea-going craft must be employed in the traffic, and that both the Royal and Grand Canals have prescriptive rights, it would, to the best of my judgment, be unjust as well as impossible to interfere with in any material degree, the more so as the navigation possesses a certain value as competing with the railways.

Mr. Bateman as above shown contemplated the desirability of lowering the level of Lough Derg by one foot in advance of a flood, and were the works now proposed at Kilsloe carried out another foot of storage capacity might possibly on exceptional occasions be secured; the question therefore is whether in view to the value of such a measure Mr. Bateman's suggestion should not receive legal sanction under such provisions as would substantially leave untouched the navigation rights above adverted to.

Up to about 1850 when steamers of a large class used to convey passengers from Shannon Harbour to

Kilsloe and vice versa, the maximum draft of vessels so plying was greater than at present, when from the returns furnished it would appear that the draft varies from a minimum of 4 feet 9 inches to 5 feet 3 inches maximum. Under these circumstances, and allowing for "sloofy," the depth across Lough Derg on the navigation track, generally taken at 13 feet, would suffice, and this is now quite assumed except at the northern extremity where, between Derry Island and the so-called "pigeon shoal," some slight work may be required, as also in improving the approach to the Scarriff river, quay, and basin. This, however, would necessarily form portion of the scheme now proposed, and there would then be no further difficulty as once the river is entered the needed depth, 6 feet, can then be secured by the suggested excavations at Whiteford, Derrysholman, and Bishop's Island. It thus seems feasible that measures may be adopted which would empower the Board to lower the navigation depth at Kilsloe by nearly two feet up to the Victoria Lock, and thence to Athlone and Turnmerry by one or perhaps one and a half feet without incurring substantial injury to the present vested interests, the powers so conferred to have effect for the four months, June to September, inclusive, if not considered desirable or necessary at other periods.

In putting forward a proposal to expend so large a sum on the Shannon wholly in the interests of the flooded lands it is not to be supposed, looking to the very substantial advantages already conferred on the owners and occupiers, that I would venture to suggest the £160,000 required should be given as a free grant by the State.

That there exists a difficulty in ascertaining the precise value of the relief afforded has long been admitted; in fact it is the one which necessitated the alteration of the provisions of Act 5 and 6 Geo. IV., c. 67, under which the respective leaseholders from the joint navigation and drainage scheme then contemplated, were to have been charged in proportion to the benefits to be conferred, as regards locking the lands from inundation, and necessitated the passing of the subsequent Act 3 and 3 Vict., c. 61, which relieved the owners from all charges and drainage and placed these (amounting to a variety of the total expenses incurred) as a navigation charge upon the several counties and baronies shown in the annexed map.

The difficulty adverted to it is almost needless to explain consists in ascertaining the precise amount of relief afforded to each and several of the inundated lands, as it would no doubt be open to the owners to prove that in a particular year and under specially adverse circumstances, owing to extraordinary high floods, some of the land may not have received the full benefit on which the charge had been assessed.

The difficulty, if not indeed the impossibility, of proving the validity of the charge for full benefit under such exceptional circumstances, may I venture to think be admitted without, however, in any equitable sense impugning the justice of fixing and enforcing such a proportional charge, as on a full consideration of all the merits of the case may appear to be indispensable. Without any desire to offer an absolute opinion as to what should be the amount of this charge to be comparatively placed on the whole of the inundated area, I would draw attention to one or two facts which would seem to furnish a sufficiently reliable basis for the calculation.

As before shown, out of 34,700 acres which were inundated before the Shannon Commissioners commenced their operations, no less than 13,500 were completely relieved, and the remaining 21,200 were placed in a much more advantageous position than before as regards the duration to which the lands were exposed to flood action. From the joint valuation made in 1855 by the late Mr. Lyman, writing on account of the landlords, and by Messrs. Birmingham and Gale for Government, it was found that complete relief would enhance the value of the area in question by a little over £5,000 per annum, and applying the same average to the 13,500 acres previously relieved—say about £1,600—we find that over £9,000 per annum

would represent the increased value of complete relief to the whole 34,700 acres comprising the area originally inundated.

If the increased relief afforded by the sluices and other lately executed works be added to that which may fairly be claimed for the works now proposed, it may be assumed with, I believe, perfect justice that a charge equal to one-third of the amount due to complete relief, viz.:—£3,000 per annum—might in strict justice be charged and imposed compulsorily. At eighteen years purchase the total capital charge would be £54,000, or making allowance for possible reductions, say £50,000, which might be treated as a loan repayable at five per cent. in thirty-five years (principal and interest) as balance of the £100,000 proposed now to be expended, leaving £50,000 to be if possible met by free grant from the State. It must in this connexion be borne in mind that had effect been given to Act 37 and 38 Vic., cap. 60, £150,000 would have been already expended as free grant. Consequently under the scheme now suggested, taking into account the £55,737 spent on the sluices, &c., there will be an actual saving of £41,545 on the grant originally contemplated by Parliament.

Were the present proposal adopted the incidence of the charge would only amount to a general average of 1s. 6d. per acre per annum terminable in 35 years, a charge so trifling that it is impossible to conceive any owner or occupier raising the slightest objection to it.

The charges might I think be levied and collected in somewhat the same way as County Cess.

As it has been pleaded in some quarters that as a fact the owners of the inundated lands in meeting their share of the £320,860 (being principal and accrued interest) paid by the counties and baronies towards the Shannon Navigation works, I find that summing the value of the 34,700 acres inundated at 15s. per acre the proportion which fell upon the owners was only £2,791 or an average capital charge of 1s. 7½d. per acre. There can thus be no seriousness in the plea.

In conclusion I may be permitted to observe that although putting forward this scheme in the hopes of relieving the inundated lands to an extent very nearly, if not quite, to meet such exceptional cases as the flood of August, 1861, no absolute guarantee can be given that such will be the case, still less that there will be entire immunity from damage by those attacks of water which occasionally occur after a series of years, and again that the scheme being one for dealing with the lands as exclusively under meadow, those occupiers who trusting possibly to immunity from flood for several years in succession may turn the meadows into tillage land, must do so entirely at their own risk. There will, I fear, be great temptation to try tillage but, if so, serious occasional disaster may be looked for.

R. H. SANKEY, R.E.  
Lieut-General.

23rd November, 1865.

## TO THE ROYAL COMMISSION ON IRISH PUBLIC WORKS.

GENTLEMEN.—As another demonstration is the clearest of all evidence, I prefer to first refer you to the visible facts which your late session of 9th instant on the Lower Bann has disclosed to you:—

1. That by the very singular incident of a dry and frosty Irish winter you found the river at its lowest possible level, below which it cannot fall in its present artificially obstructed state.

2. That notwithstanding this great reduction of the river you sailed over fully eight feet deep of water, held in complete stagnation, with no current for its own discharge or for purging out the mud and drift sand of the lakes and their tributaries.

3. That to secure this perpetual depth of eight feet of water, for floating the so-called Bann Navigation, you passed through four locks with weir walls of solid stone, turning the great natural discharge of Lough Neagh and Lough Beg into an ordinary canal on different levels.

4. That the first of these levels ending at Fortna, destroys the drainage power of the Bann for fifteen miles, by a double lock which obstructs at that point fifteen feet of the natural fall of the channel which, added to the obstructions of the other weirs, makes an aggregate loss of fall for drainage of forty feet, leaving only nine feet available in 30 miles. Hence the great floods and the grievous taxation imposed upon the farmers for maintaining these works to more effectually destroy their industry and health.

5. That as no one can possibly stop these floods, the capacity of the Bann should not have been diminished by eight feet of stagnant water, leaving often as you saw only two or three feet of the banks of the river to contain the discharge of the lakes and their tributaries.

6. Lough Beg, a vast expanse of shallow water, in the heart of the country, three miles long, two broad, covering 4,000 acres of reclaimable lands.

## THE EXCLUSIVE DRAINAGE QUESTION.

*General Remedial Reasons and Arguments.*

1. The great and permanent value to Ireland of her agriculture, the staple industry of the kingdom, so much dependent on the drainage of the soil.

2. The present and increasingly depressed state of Irish produce to which no injury should be added under any pretence whatever, especially such as promise no return whatever.

3. The great range of agricultural interest involved in this question extending largely into two counties of this province, with a water line on the lakes and Bann of 140 miles, and double that length along their tributaries.

4. That as Ireland compared with Great Britain possesses no mines or minerals, inland water carriage is quite unequalled for, as there is no bulky matter to carry, and when such a project interferes with the drainage of the country it is a hideous mischief and is utterly intolerable.

5. That, fully investigated by the Royal Commission of 1882 on Drainage and Navigation, Ireland, the whole system of Inland Navigation, costing £4,752,211, is a complete failure. See page 10 of Report.

6. That in this general survey the Commissioners included the Lower Bann Navigation, which they pronounced to be utterly Utopian and a standing grievance on the agricultural community of the great district of Lough Neagh, by floods and taxation, and recommended:—"That this navigation be dissolved and the river turned into an exclusive drain, in the sole interest of agriculture." (See page 12 of Report.)

7. That this proposition of the Royal Commission

of 1882, for clearing the Bann of all obstructions to drainage, is simply corroborated by the survey and report of Mr. J. B. Palmer, C.E., engineer of the survey, who is himself corroborated by Mr. O'Neill, Mr. Barton, and Mr. Manning, engineers, who, although not going all the way of removing the weir walls, strongly recommend abiding of them on a large scale, which is tantamount to removal.

8. That to compel the farming class to construct and uphold a system of mechanical works (to their own great injury), for the speculative benefit of a mere fraction of the mercantile class, is wrong in principle, and in practice is not to be endured.

9. That the farmers themselves always objected to the Bann Navigation Works, and left it entirely to a few citizens of Coleraine to tank the folly of the project, which they did for ten years time, and, by many speculations, all ending in loss, until in the year 1873 the steamboat was sold at a loss, and the navigation abandoned by them.

10. That, suppose a few citizens of Coleraine should profit by the use of these fixtures in the Bann, would that be a reason why the farmers of the great districts should lose, in crops and taxation, ten thousand pounds yearly, and that the mill workers at Fortna should starve by the stoppage of the factories on the Upper Bann?

11. That, as it is laid down as an axiom by all political economists:—"That a Government, by its existence, is bound to confer the greatest possible happiness on the greatest possible number of its subjects," it is a cruel thing to have sacrificed the material interests of the many to the caprice of the few for thirty years past in the case of the Bann.

12. That these few citizens of Coleraine, that are so selfishly clamorous about what they call their claim to the Bann, and its present works as part of the moiety of the river, which they, at great cost and loss, have turned into moving traffic, have no ground whatever for this allegation, as by the fundamental scheme of the Bann navigation it was determined to be entirely inland.

13. That this exclusive and inviolable use of the Lower Bann, as the first link of the inland chain, is shown by the terms of the Charter lately granted by Government to the Coleraine Board, by which the persons of the foreign trade are strictly prohibited from touching or using any part of the river Bann above the county bridge.

14. That the Lower Bann, as at present occupied by locks and weirs, strictly belongs to the people of the counties through which it runs, to deal with it in their own interest, is determined by the law of the land, in the united opinion of two eminent Counsel (one of them now a Judge), who advised, "That in such navigation as the Lower Bann all locks, weirs, works, rights, remedies, and appointments are the property of the county or counties in which they are situated, and the occupiers are the party to say whether or not they are satisfied with the results of the navigation for which they pay" (page 14, &c.)

15. That acting on this advice of Counsel and the recommendation of the Royal Commission of 1882, the drainage and navigation taxpayers of Derry and Antrim counties held numerous public meetings at Killea, Aggre, Ballymoney, and Tossan, &c., at which they passed many and strong resolutions asserting their rights and adopted many memorials to the Irish Government.

16. That to ground these popular appeals the sufferers of the floods and taxation employed two engineers, Messrs. Losh and Palmer, C.E., to execute surveys and reports of the river Bann.

17. That this was followed up by two several deputations to Dublin Castle, which not proving suc-

centful, some of the indigent sufferers took the law into their own hands and blew up the locks on the Bann with midnight dynamite, and we dare not venture to say that even in Ulster such breaches of the peace may not be repeated by a class so long and sadly outraged as the farmers along the Bann and lakes of the district.

18. That the native fishers, a large community round Lough Neagh, have, in common with the farmers of the district, strongly agitated for the removal of these weir walls, by which the eel fry and the brood salmon are shut out from the lakes.

19. That with the present discharging power of the Bann, artificially restricted to little more than a quarter of a million cubic feet of water each minute of time against often three millions cubic feet coming into the lakes each minute of time, there is no proportion to this ingross water rushing into the lakes off a catchment area of 2,000 square miles of this wet north part of the kingdom, scooped in by mountain ranges where torrents rise and precipitate their floods into the lakes with great velocity. Hence the floods in five centuries.

20. That under present circumstances there is no relief for these inundations, as the Drainage Board have got power over only three and a half miles next the lakes, where there is no fall possible, although they do exercise their power of local taxation sometimes up to £5,000 yearly.

21. That the Coleraine Harbour Board can have no possible prospect of reserved traffic on the Bann, as no one along the line would give anything to carry or accept any commodity from them; and as this aversion was the cause of the first lapse, it will be more so now, up to boycotting, as railways on each side the Bann and crossing it have linked all the towns and monopolised all traffic, with despatch and certainty unknown to water carriage, for goods and passengers.

22. That finally, and in justice and equity, the Government are bound to respect and fulfil the solemn contract which they made with the people of the district of Lough Neagh, in the year 1816—forty

years ago—by which they engaged to reduce Lough Neagh from winter and spring and autumn levels to uniform summer level the year round, a difference often of ten feet; but which after a waste of twelve years time and a cost of £251,000 public money, they miscarried, by leaving twenty-six thousand acres of lands purported to be drained, still unenclosed for most the year, and as much lands adjoining, partially drained—and this was done by the huge blunder of expending one hundred and ten thousand pounds in locks and weir walls in the channel of the Lower Bann, to defeat the drainage of the district and promote a project of navigation that never had a prospect of success at any time, and long since died a natural death, as you personally witnessed by inspection of the lock look of Portna, and by seeing no vestige of traffic upon the Bann.

Now, as the Government took this money of the farmers and misapplied it to their loss and injury, so much and so long, are they now to call upon these sufferers in pocket and property to repair the blunder of their rulers by removal of these obnoxious works out of the Bann! Scarcely not, exhausted as they are, by floods and taxation, and by the depression of their industry, they cannot do it, and they hope and pray that, as permitted by the present Government, this Royal Commission will kindly plead the necessity of a grant from the Treasury, pleading the precedent of the £38,500 granted lately to the much less loyal and peaceable subjects of the Crown upon the banks of the river Shannon, for drainage, by lowering and sluicing a channel that must needs continue to be navigable; and that if any taxation is adopted it should be spread over a large area, as at present, of forty-four times the lands drained, by reason of these high levels discharging waters on the lower.

JOHN CARRUT, Chief Secretary of the  
Lough Neagh Drainage Association

Railty Cottage, Toome,  
March 14th, 1857.

#### ARTERIAL DRAINAGE—SUGGESTED HEADS OF EVIDENCE.

##### 1. Importance of Arterial Drainage to Ireland.

###### Advantages to Land reclaimed. —

- (a.) Arable.
- (b.) Pasture.

###### Indirect advantages.

- (a.) Effect on climate of district.
- (b.) Increase of rentable value.
- (c.) Improved intercommunication by main roads and between farms.

2. Amount of work remaining to be carried out with advantage either to the land reclaimed or to the district in general.

3. How far has advantage been taken of the facilities for promoting Arterial Drainage afforded respectively by—

- (1.) The Act of 1849;
- (2.) The Act of 1853;

4. What causes have prevented a more complete adoption of these Acts?

5. What changes in the law are needed in order that districts still requiring drainage may be relieved?

6. Proposals that have been made:—

- (a.) Change to be direct on occupiers.
- (b.) Drainage Board to be elected by occupiers as well as owners.

7. If drainage charges were imposed directly on occupiers of lands, how should they be recovered?

8. Area of contribution:—

- (a.) Should charge be borne by towns in districts? and, if so, in what proportion?
- (b.) Should all land in river basin be made to contribute whether directly benefited or not? If so, in what proportion?

9. It has been suggested that the Government should take the initiative, or give special help in the formation of drainage districts.

10. What precautions, if any, should be taken to prevent drainage districts being formed in such a way as to injuriously affect other districts, either by the omission of areas which ought, for physical reasons, to be included with them, or by direct injury in the way of increased floods?

##### Maintenance of Arterial Drainage Works when complete.

1. How could present system be improved?
2. Should there be more Government supervision; and, if so, how should it be afforded?
3. Is any improvement required in the methods of enforcing the law against persons who neglect their duties of maintenance?
4. What are the relative advantages of large and small maintenance districts?

##### Navigations.

1. Direct and indirect advantages or disadvantages of navigation to—

- (a.) Adjacent land.
- (b.) Neighbouring towns.
- (c.) Surrounding districts.

2. What effect, if any, on rates charged for other means of transport.

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- Would have charges recovered as are loans under Land Act, 3443.
- Thinks initiative in farming district should be taken by Government, 3454.
- Should be more Government supervision, 3450.
- Would suggest a periodical Government inspector, 3482.
- Fish in river should be looked after and preserved, 3484.
- Remission of loan in case of Fermis district, 3485.

**GILLESPIE OF IRELAND**—

- Remarks on, *Kincaid*, 343.

**GIVEN, CAPTAIN** (A Trustee of Lower Bann Navigation).—

- Evidence on Bann river and navigation, 761, 488.
- Traffic on river, 490.
- Thinks that navigation would increase if river were improved, 512.
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**GRADAM, DAVID** (Superintendent of Lower Bann Navigation).—

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- Tolls taken on river, 283.
- Chiefly levied on fishing boats, 371, 372.
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- Drainage area described, *P. Fitzgerald*, 3078.

**GREENE, SIR JOHN BARR**—

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- Opposed to taxing entire area unless improved, 4426, 4438, p. 390.
- In case of Barrow would extend taxation a little beyond area improved, 4435.
- Valuation of entire watershed of Barrow above Athy is £218,000, of which £50,900 represents flooded area and towns, 4445.
- There is no power under Valuation Acts to increase the valuation of improved lands, 4452.
- Seven years would be the proper time to allow before increasing valuation, 4458.
- Towns in district ought to contribute to cost of drainage, 4463.
- Considers that in the Barrow district the Government should contribute half the cost, 4470.
- Influence of drainage on temperature, 4481.
- Gives table showing proportionate charge on each of the three zones, if Barrow district were so divided, *App.*, p. 250.
- Remarks on Messrs. Haussen's and Kincaid's memoranda on statistics of Barrow valuation and area, *App.*, p. 250.
- Memorandum on the character and area of land in Ireland requiring drainage, *App.*, p. 279.

**HARTY, WILLIAM, C.E.** (County Surveyor, Donegal).—

- Describes drainage districts in County Donegal, 5258.
- Effect of drainage on climate is nil in Donegal, 5264.
- Embankments on the Euxa Estate, near Lifford, 5265.
- Present procedure under Drainage Acts criticised, 5291.
- Would have similar procedure for carrying out drainage on there is at present for making roads and other county works, 5293, 5310.
- Particulars respecting Swillybarr Drainage, 5293.
- Sees no necessity for Government interference in imitating scheme, 5294.
- District boards should not be allowed to interfere with engineer, who should be only denominated by public authority, 5296, 5309.
- Rebuilding of bridges, 5309.

**HARRIS, RICHARD, M.C.E.** (Analysis of evidence on Barrow).—

- Explains scheme for arterial drainage of Barrow, 774.
- Cost of scheme, £250,000; 1861, 775.
- Provides for a maximum discharge of 530,000 cubic feet per minute at Athy, 779.
- Considers Mr. Manning's prices too low, 781, gives his own prices, 782.
- Explains how mills and wens would be dealt with, 786, 794.
- Cost of scheme to be borne partly by district and partly by Government grant, 798-805.
- Embankments would not be of much use on Barrow, 814.
- Effect of drainage above Athy on river below, 823.
- Lower Barrow a curious river: full increases as it approaches the sea, 830.
- Neglect of Lower Barrow by Navigation Company, 839, 871.
- Recommends imposition of compulsory rate on whole district for repayment of drainage charge, 850.
- Sanitary improvement to district, 856.
- Machinery for collecting drainage rates should be sent as for county cess, 859.
- Difficulties in way of embanking Barrow, 3512.
- Enters into engineering details with reference to Barrow, 3525.
- Memorandum giving statistics of acreage and valuation in Barrow district, showing how money required (£250,000) could be raised, *App.*, p. 280.

HILL, JOHN, C.E. (County Surveyor, County Clare, Board of Works Drainage Inspector).—

Importance of arterial drainage in Ireland owing to the configuration of the country, 1264.

Effect of on arable and pasture land, 1364.

Improvement in suitable values owing to, 1266.

Length of time before improvement takes place, 1271.

Advantages and disadvantages of winter floods, 1269.

Most of work done under the Act of 1842 would require examination and consideration again, 1296.

Would not suggest any amendment in present law, 1398.

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Would have a minimum qualification for members of £50 a year, 1325.

Towns should contribute where improved, 1332.

Would put most rivers under separate Boards for entire watershed, 1336.

Discusses question of the Shannon drainage, 1344-1370.

Thinks there should be a central authority to help in formation of drainage districts, 1371.

Discusses drainage of Barrow, 1381-1398.

Does not approve of embanking river, 1300-1414.

Should be a permanent department to look after maintenance, 1422.

Causes of inefficiency of small districts, 1428.

Navigations—advantages of for heavy traffic, 1429-1456.

HUNTER, STEWART (Harbour Commissioner, Coleraine).—

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FORBES, 1684. *Salween*, 1718.

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*Le Foug*, 37.

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INSPECTORS APPOINTED BY BOARD OF WORKS UNDER DRAINAGE ACTS.—

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Can rent be increased by Board of Works for drainage improvements?

Yes, *J. P. F. Fitzgerald*, 4763.

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Drainage districts in, *Morgan*, 5182.

KINAHAN G. HENRY, M.R.I.A. (District Surveyor in the Geological Survey of Ireland, Vice-President Royal Geological Society).—

Has carefully studied the Geology of Ireland, 941.

Richest soils in Ireland are (1) in the Valley of the Lagan; (2) in the valley of the Suir; (3) in County Limerick, 942.

Effect of drainage on arable land, 943; on value of land, 953.

How bog land is reclaimed, 954-957.

How drainage of land is carried out, 978-983.

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Improved inter-communication resulting from, 999-1009.

Owners and occupiers should pay drainage charge in certain proportions, and both have a voice in management, 1016.

Drainage charge should be collected as in county cess, 1019.

Charge should be borne by towns in district in certain cases, 1025-1028.

Recommends that there should be a government inspector with compulsory powers to form a district if necessary, 1038.

Entire river should be included in the drainage district, 1040.

Maintenance at present neglected owing to there not being sufficient surveillance, 1047.

Where there are navigations and weirs should be abolished and flood gates put in, 1061-1062.

Should be fish-passes in weirs, 1069.

Arterial drainage, how affected by fishing rights, 1072-982.

KINCAID, J. STEWART.—

Is a Land agent, 1982.

Would give compulsory powers to Drainage Boards to carry on works, obtain outfalls, &c., 1885.

Effect of Land Acts in stopping arterial drainage, 2609.

Under Act of 1881 landlord has lost all interest in improving lands, 2003.

All risks now thrown on landlord in cases of drainage, 2003.

How Drainage Board should be formed, 2041.

Qualification for electors, 2043.

Qualification for members, 2049.

Landlord should have a voice in scheme, 2064.

Would give towns a collective vote only, 2073.

Would not give small occupiers (below £8 or £10) a vote at all, 2077.

Charges should be recovered as in county cess, 2090.

How the Board of Works collects the charges, 2018.

Charges should be borne by town in proportion to value, a, 2094.

Would have two charges on district—one for lands directly benefited, and another for the whole area, 2095.

Without official help no districts would be carried out, 2107.

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Memorandum giving particulars of valuation of Barrow district, and showing how money could be provided for carrying out work, *App.*, p. 250.

Area of taxation should include entire watershed, 2427.

French system as regards taxation for drainage, 2432.

Duke of Richmond's Commission in England, 2436.

Principle on which it recommended that charges should be imposed, 2439.

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Discusses cost of Barrow drainage, 2440.

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## LAND ACT of 1881:—

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## LANEBOURD:—

Liability of for drainage charge on land, *Le Fane*, 32-37.

## LA TOWER, PASCY (Chairman Barrow Navigation Company):—

Sends letter to show that proposed schemes for draining the Upper Barrow would be injurious to the interests of the Barrow Navigation Company, 2768.

The making of the Barrow Navigation was undertaken by the Government in 1759; in 1790 handed over to the Company, 4901.

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## LEACHMAN (Co. Donegal):—

Drainage on, *Kinnaird*, 599.

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## LE FANE, W. R. (Commissioner of Public Works):—

Succeeded Sir Richard Griffith in charge of Drainage Department of the Board of Works, 1.

Describes procedure under the Drainage Acts, 1-15.

Causes of estimates for drainage works being frequently exceeded, 2, 3, 57.

Inspectors appointed by Board of Works under the Drainage Acts, 4, 5.

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Proprietors entitled to have increased rents to be paid by tenants fixed by Board of Works, 16.

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Thinks that where Government makes a grant it should undertake the works through a department of its own, 5476.

Drainage districts generally obtain considerable benefit from the works for some time before award is made, 5483.

Gives example of delay in Milford (Co. Cork) drainage district, 5485.

Does not think that the Government should design the works itself, 5485.

Thinks valuation of improvements should be very closely looked into—they are almost invariably too high, 5485.

Government should defray cost of preliminary inquiry, 5485.

Thinks large schemes (e.g. Barrow) should be carried out by a Government department, and for maintenance handed over to a local board, 5490.

Thinks valuation of improvements should be made before, not after, works are carried out, 5495.

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Thinks that awards required to start a scheme should be specific to the imposition of a certain charge on the holding and not general, 5512.

Best charge in repayment of loan should be assessed on occupiers, not on proprietors, 5520.

Thinks the Board of Works could collect the rent charge, 5557.

Method adopted for collecting charges at present by Board of Works, 5545.

The Perry Council should be the final confirming authority for a drainage scheme, 5548.

Objections to having to go to Parliament for confirmation, 5548.

There should be increased powers given for dealing with mills, 5558.

Thinks that it would be better to fix compensation by some judicial body (e.g. Land Commission) rather than by arbitration or juries, 5562, 5564.

Thinks Board of Works have sufficient powers under Drainage Maintenance Acts, 5566.

Thinks they have also sufficient powers of punishing for neglect or injury, 5579.

Penalty for cutting an embankment, 5571.

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Returns show that districts are rapidly coming to be formed since Land Act of 1881, 5575.

## LEWIS, Wm., C.E.:—

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How scheme would be carried out—introduction of movable sluices and weirs, underpinning certain bridges, &c., 712.

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How weirs to be dealt with, 735.

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## LINCOLNSHIRE RIVER:—

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## LYLE, JAMES A., J.P. (Treasurer of the County

Londonferry):—

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## M'KEOWN, JAMES (Look-keeper on Lower Ban).—

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## MACMURDO, Mr.:—

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## MAHER (Co. Limerick):—

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## MAIN (Co. Antrim):—

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## MAINTENANCE OF ARTERIAL DRAINAGE WORKS:—

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Not sufficient surveillance; a Clerk of Works should go over each big river after every flood, and examine into its state, *Kinnaird*, 1047. Should be a River Surveyor, as well as a Road Surveyor, *ibid.*, 1051. Should be a Board of Control for Drainage, on same principle as a Grand Jury, *ibid.*, 1059.

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- Would have a special Maintenance Board for every river, whether works are constructed or not, *Barrington*, 5552.  
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## MANNING, ROBERT, M.P. (Engineer to the Board of Works).—

- Evidence on Drainage of River Barrow*, 102.  
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Discusses question of embanking river, 2588, 2596.  
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Discusses and criticises Mr. Berton's proposals for improving river, 5671.  
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## MARTE, E. MULHALLER (M.P. for North Kilkenny).—

- Gives evidence with regard to two drainage districts in Kilkenny, 5182.  
Would extend incidence of taxation to whole catchment area, 5189.  
Would have independent Board to take charge of the entire drainage scheme of Ireland, 5196.  
Describes drainage district on the river Nore, 5196.  
Would collect Drainage Rate through Poor Rate (not County Cess), which would enable occupier to deduct portion from landlord, 5206.  
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- Should be a new Drainage Board—there is a prejudice against the Board of Works, owing to its past history, 5233.  
District Boards should consist of two-thirds occupiers, and one-third owners, 5236.  
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## MILFORD (Co. Cork).—

- Drainage District.—Delay in making final award, *Le Faus*, 5483.

## MILLS.—

- Additional way of Drainage Boards, *Gorey*, 5491, *Sanders*, 2111. Drainage Boards should get increased powers for dealing with, *Le Faus*, 5557.  
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## MISSISSIPPI.—

- Floods on, *Manning*, 2560.

## MITCHELL, RICHARD A.—

- Secretary of Barrow Navigation Company, 2767.  
Letter from Mr. Percy LaTouche pointing out that scheme for draining Upper Barrow would be injurious to Barrow Navigation Company, 2769.  
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Charter of Company gives them "the soil and water thereof," 2780.  
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Capital expended on the Navigation, 2791.  
Net receipts of Company, 2802.  
Traffic on part of river taken over by Grand Canal Company in 1878, 2809.  
Nature of traffic on river, 2818.  
Tolls charged on river, 2825.  
Difference between Railway and Navigation rates, 2878.  
Ten mills and twenty-two weirs on river below Athy, 4701.

## MONTANA (GALWAY).—

- Drainage District, *Thamesand*, 1462. *Richardson*, 2206, 3244.

## MOORE, JAMES WILLIAM, M.D.—

- Describes climatic improvement that would result from drainage in Ireland, 3631.  
Describes climate of Ireland, 3633.  
Affording the country would probably dry the soil at first, but after a time increase the rainfall, 3643.  
Bogs have an anti-malarial tendency, 3654.  
Barrow floods keep down temperature in summer, 3670.

## MORROW, ROBERT (Glenties, Co. Antrim).—

- Describes hardships suffered by occupiers from flooding on River Mann, owing to mill obstruction, 2183-2225.

## MULHALLER (Co. Limerick).—

- Floods increased on lands below drainage district, owing to carrying out of works, *Le Faus*, 98. *Barrington*, 1192.

## MULVANEY, CHRISTOPHER, C.E. (Engineer to the Grand Canal Company).—

- Examined the River Barrow from end to end in 1855, on behalf of the Navigation Company, examined it again in parts in 1882, 5579.  
Gives extracts from his report describing state of particular parts, especially as regards shoals, 5580, *et seq.*

MURPHY, EDWARD (Land Agent, Donegal, Down, and Antrim).—

Has acted as arbitrator under Board of Works in assessing compensation for land taken and damage to property, 3592.

Describes obstacles in way of getting up drainage district, as shown in cases of the Liffey and Upper Finn Rivers, 3496.

Deficient in assessing compensation for mills, 3503.

Excessive compensation often given by juries, 3504.

There should not be an appeal from arbitrator to a jury, 3504.

Compensation for disturbance to col weirs and fisheries, 3519.

Area of taxation should include entire district, 3530.

Valuation of improved land in Barrow district much too low, 3546.

Would tax all land in area in 1905, 3551.

Collow lands improved by flooding, 3570.

Embankments on the Finn River in Donegal, 3589.

How arbitrators are appointed by Board of Works, 3583.

Drainage Board should have jurisdiction over entire river, 3596.

Would give power to one third of people in district to initiate a scheme, 3600.

Drainage Board should be composed of occupiers—would select highest rated, 3613.

Board of Works should be bound to inspect main-tenance districts every year, 3630.

#### NAVIGATION.—IRELAND.—

Advantages of, *ibid.*, 1459.

Should be maintained if people of district so desired, *O'Keefe*, 1970.

Solid weirs should be abolished and flood-gates put in, *Kinsale*, 1961.

Should be under Central Drainage Board, *Roberts*, 3023.

Jurisdiction of Board of Works over, *Le Fane*, 48-53.

Lower Bann Navigation. See BANN.

Barrow Navigation Company. See MITCHELL, LA TOUCHE, and PRICE.

#### NEIGH—

Drainage districts on, *Morass*, 5196.

NEILL, EDWARD:—Secretary to the Lough Neagh Drainage District.

Drainage Trustees of Lough Neagh district are chosen by contributing proprietors, 3673.

They consider that the floods are caused by the obstructed state of the Lower Bann River, 3672.

Two and a half miles of Lower Bann are under the Drainage Trustees, the remainder under the Lower Bann Navigation Trustees, 3784.

Quotes Mr Manning to prove neglected state of river, 3786.

Contends that the trustees are entitled to have river restored to state originally designed by Mr MacMahon, 3808.

Navigation Trustees did not consider that they were liable to keep channel in order until 1860, when they got Mr. Barton to report on the state of the river, 3830.

The total outlay on district for drainage and navigation was £254,167 4s 11d, 3839.

Explanation of how the money is charged, 3832.

There is nothing to show the state in which the river was in 1860, when taken over from the Board of Works, 3849.

#### OCCUPIERS, REPRESENTATION OF ON DRAINAGE BOARD.—

*Le Fane*, 39. See ARTERIAL DRAINAGE (6).

#### O'CONNOR DOY, THE:—

Chairman of River Black Drainage Board, 4890.  
Gives detailed history of Black Drainage Board, 4913. Is the largest district ever undertaken by a local Board, *ibid.*

Gives area and dimensions of district, 4953.

Original estimate was £94,000, and £90,000 has been expended, while only one-fourth of work has been done, 4954.

Difficulties that arose during progress of work, 4948.

Last year had to get a private Act of Parliament giving an extension of time—a clause giving representation to occupiers inserted, 4978. *Le Fane*, 9.

Considers there should be a qualification of £20 for members of Board who are occupiers, 4883.

Thinks it would be impossible in future to have any drainage schemes carried out under the old system, 4885.

Would have whole catchment area under one management, 4888.

Opposite opinions have been given by counsel on point whether Board of Works can increase terms for drainage in case of judicial tenants, 4890.

Thinks there ought to be powers to enable Drainage Boards to be wound up after a portion of the work is done, if advisable, 4908.

Effect of work done on upper and lower parts of River Black, 4903.

Calculated by Mr. Coddington that it will take £140,000 to complete works on river, 4913.

#### O'KEEFE, CORNELIUS (Sub Land Commissioner):—

Effect of drainage on fertility of land and on climate, 1855.

Decrease in amount of cereals grown in Ireland of late years, 1860.

Benefits of winter floods, 1874.

When increase in rental value taken place, 1880. Seven years as a rule not sufficient, 1889.

Thinks that giving up tillage farming in favour of pasture injurious to the community, 1895.

Canals which have prevented drainage from being carried out in many cases, 1919.

Qualifications for members of Drainage Board, 1937.

Drainage charges should be recovered as in county cess, 1941.

As a rule, opposed to putting charge on towns, 1944-1949.

Would lengthen time for repayment of charge, 1955.

Would extend limits of Drainage Board, 1960.

How to secure the proper maintenance of drainage works—would have an inspector, 1966.

Would keep up Navigation if district desired, 1970.

#### O'NEILL, WILLIAM JAMES (Engineer of the Lough Neagh Drainage District):—

Describes encroachments on the river, 3661, 4165.

Works recommended by Mr. MacMahon—as what extent carried out, 3664, *et seq.*

Describes his own scheme, drawn up in conjunction with Mr. Lanyon, for dealing with the River Bann, 3962-3977.

Cost of carrying it out would be £282,500, of which £25,000 should be contributed by Navigation Trustees, 3985.

Comparison between this scheme and Mr. Manning's, 3980.

Describes the River Blackwater in Armagh, 4008.

Area of taxable land on the Lower Bann, 4054.

Incidence of drainage tax on district, 4059.

Would tax entire watershed—in different proportions, 4071.

Gives evidence regarding state of the Lower Bann, and what would require to be done to improve the river, with special reference to Mr. Barton's report, 4079.

## O'NEILL, WILLIAM JAMES—continued.

Gives engineering details respecting the navigation cut at Portna, 3725.

Thinks embankments would be very effective on Upper Binn, 3769.

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## FERRELL, THOMAS (Belmont, Kings Co.) :—

Describes damage done to his property by drainage on larger streams, 3685.

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## FOLLOCK PROPERTY IN GALWAY :—

How cleared and drained, *Witness*, 1927.

## FOSTER, J. GLEN VERTY :—

Describes difficulties he encountered in getting the Lough Erne Drainage Works undertaken, 4365-4387.

## PRICE, JAMES, M.C.E. :—

Would show that carrying out of drainage scheme on Upper Barrow would injuriously affect the lower river, 873-877.

Explains his scheme for drainage of river, 878.

Would form impounding reservoirs, 879.

Thinks that 100,000, or 120,000, should be spent on improvement of lower river, 887.

Amount of water passing down river, 887.

Estimated cost of carrying out his scheme on the Upper Barrow, 414,050, 911.

Area which should be taxed should comprise the entire catchment basin, 924.

General rate for navigation levied on Lough Erne, 928.

Knows no instance of general rate for drainage, 927.

Rate should vary on high and low grounds, 934.

Towns should be rated, 933.

Thinks that if Board of Works' scheme were to be carried out, 120,000, should be spent in addition on the Lower Barrow, 940.

Advantages of embanking river, 2472, *et seq.*

Explains how it could be carried out and cost, *ibid.*

Appears to represent interest of Lower Barrow, 4491.

Describes course and area of Barrow, 4494.

Describes river, and mills situated on, from Athy down, 4495.

No one responsible for keeping river in order, 4516.

River in a bad condition between Ardee and Lerris- town, 4521.

Town of Carlow subject to flooding, 4538.

Bad sanitary conditions from floods, 4573.

Claims for compensation would be made if more water were sent down from Upper Barrow, 4650.

Gives reasons why if drainage works were carried out there would be more flood-water, 4661.

Suggests reservoirs for holding up flood water on Upper Barrow, 4661.

People on Lower Barrow fear that drainage above would leave them without sufficient water in summer, 4672.

Drainage area from Athy to St. Mullin's, 235,440 acres, 4674.

Length of time floods remain on district of Upper Barrow, 4688.

Apprehends that improvements on upper river would send down large quantities of silt, 4707.

His scheme for the Upper Barrow provides for no work below Athy, 4721.

Would impound in reservoirs one-fourth part of the flood water, 4722.

## PROCEDURE IN CARRYING OUT DRAINAGE :—

Under Act of 1842, *Le Faus*, 4.

Under Act of 1863, *Le Faus*, 4.

## PROPRIETOR :—

Definition of, *Le Faus*, 10.

## QUALIFICATION FOR ELECTORS AND MEMBERS OF DRAINAGE BOARDS :—

*Witness*, 2043. See ADRIERIAL DRAINAGE, 6 (b.)

## RAILWAYS.

Compete successfully with navigations, *in rule*, *Manning*, 172.

## RATHFRAN DRAINAGE DISTRICT :

Evidence respecting, *Drain*, 1349.

## RECLAMATION OF WASTE LANDS :

Place where profitable, *Straverton*, 1229, 1247.

## REICHARDSON, NICHOLAS G. (Land Agent.)

The improved value of the land, as a rule, is not equal to the cost of arterial drainage, 2332.

Describes the drainage of the Manilla district, 2344, 2396.

Landlords have lost all interest in drainage, 2338.

Would have Board elected by, and composed mainly of, occupiers, 2353, *et seq.*

Would collect drainage charges in same manner as poor rates are collected, 2389.

Should be Board of Works supervision, 2395.

Difference in cost of overage between canal and railway, 2405.

Advantages of winter floods, 2414.

## RICHMOND (DUKE OF) COMMISSION ON DRAINAGE :—

*Witness*, 2426.

## ROBERTS, SAMUEL URBIN, Commissioner of Public Works :—

Describes the different kinds of land which may be improved by arterial drainage, 2402.

Most land subject to flooding is pasture, 2405.

Five to seven years required before full improvement from drainage takes effect, 2407.

Winter floods sometimes beneficial, 2415.

Describes works carried out by himself in Lough and Galway, 2420.

Some of these works were carried out to give relief, 2428.

Would approve of having entire river under one Board, 2435, 2405.

Shannon might be divided under more than one Board, 2438.

Would have central authority for drainage, with officers to make periodical inspections and reports, 2447.

This central authority should be a Government department, and should have power to compel local Boards to maintain their works, 2447.

Would leave initiation of works to local authority, 2451.

Suggests procedure for starting a district, 2452.

Would have Central Board supply the preliminary expenses to local body, 2455.

Present procedure in forming district, 2463.

Area of contribution—would comprise entire district, including towns, 2474, 2485.

Would levy charge in proportion to the rateable value (not the area), 2484.

Would have three contributory sources—the improved lands, the counties (for the bridges), and the district at large for the surplus cost, 2485, 2490.

Imperial taxation would only be affected as regards Income Tax, 2493.

Would have District Drainage Boards elected altogether by occupiers, 2491, 2496; owners, however, might sit on Board, 2507.

How drainage charges should be recovered, 2507.

Would put navigators also under Central Board, 2523.

**SANDERS, ROBERT D. M. (Civil Engineer and Land Agent) :—**

- Importance of drainage, 2351.
- Emancipated districts in Limerick requiring drainage, 2355.
- Describes the Maline district, 2239, 2264.
- Would recommend that entire river should be placed under one Board, 2266.
- Drainage Acts not fully utilized owing to the sparsity of the proprietors, 2267; also from operation of the Land Acts, 2270.
- Charge should chiefly be put on occupiers, 2271.
- Would not choose Boards by election, 2272.
- Initiative should be in Board of Works, 2273.
- How Boards are now elected, 2274.
- Would have general charge on entire district for maintenance, but not for construction, 2284.
- Would collect drainage charge through Bank of Ireland as are charges under Land Improvement charges of Land Act of 1861, 2291.
- How districts should be formed, 2296.
- Mills a difficulty in way of Drainage Boards, 2311.

**SEANTANT ADVANTAGES ARISING FROM ARTIFICIAL DRAINAGE :—**

- Kinsken, 1032.
- In Shannon district, *Sankey*, 624.
- In Barrow district, *Howard*, 560. *T. Fitzgerald*, 2747.

**SARNEY, Lieut.-General R. H. (Chairman, Board of Works) :—**

- Historical account of works on River Shannon, 552, 625, and *App.*, p. 283.
- Shannon Commissioners appointed, 556.
- Area of charge to be confined to "flooded area," 560.
- Mr. Bateman's inquiry and proposals for drainage of river, 563, and *App.*, p. 284.
- Cost to be 250,000*l.*, *ibid.*
- Quantity of land flooded, 564.
- Shannon Act of 1874, 300,000*l.* to be expended on river, provided proprietors contributed half, 565.
- Works carried out in accordance with Mr. Bateman's report, at a cost of 58,737*l.*, 594, and *App.*, p. 284.
- Landholders do not desire that all floods should be removed, 596.
- Average number of days annual flooding since 1826, 602, and *App.*, p. 285.
- Proposed for modified scheme, at cost of 100,000*l.*, 625. For details see *App.*, p. 286.
- Very few complaints from occupiers, since sluices were put in, 615.
- Question of embanking river does not at present arise, 646.
- Commissioners have not power to reduce depth of water in river, 648.
- Present depth in the different locks, 650.
- Desirable that Killakea weir should be lowered, 676.
- None of the original expenditure on river was charged qua drainage, 674.
- Out-fall of Bock, Brown, &c., would be improved by proposed works, 684.
- Advantages of impounding floods in Lough Allen, 690.
- Value of improvements to land from carrying out of works, 692.
- Memorandum on proposed improvements in the regulation of the Shannon, *App.*, p. 283.
- Table giving summary of the principal facts connected with the Shannon River, *ibid.*, p. 285.
- Total outlay on Shannon, 875,497*l.*, of which 280,384*l.* was repaid. Details of each outlay, *App.*, p. 284.
- Average number of days flooding per annum at the different weirs before and since works, and since sluices were put in, *App.*, p. 285.
- Navigation on river—tolls collected on upper and lower divisions of river since 1870, *App.*, p. 286.
- Character of goods carried in the year 1855, *ibid.*, p. 286.
- How money required for scheme (100,000*l.*) should be charged on land, *ibid.*, p. 284.

**SHANNON :—**

- History of works on river, *Sankey*, 552, 623.
- Mr. Bateman's inquiries and proposals for relief of flooded area, *Sankey*, 563, and *App.*, p. 284.
- Shannon Act of 1874, *Sankey*, 563.
- Works done in accordance with Mr. Bateman's report, *Sankey*, 594, and *App.*, p. 284.
- People do not wish to have all flooding removed, *Sankey*, 596.
- Average number of days annual flooding since 1826, *Sankey*, 602, and *App.*, p. 285.
- Present depth of water in the various locks, *Sankey*, 650.
- Original expenditure on river was not charged for drainage, *Sankey*, 674.
- Value of improvements to land from carrying out of works, *Sankey*, 692.
- Table giving principal facts with regard to Shannon, *Sankey*, *App.*, p. 283.
- Would not put entire river under one Board, *ibid.*, 1344.

**SINGLETON, MAJOR HENRY CORRIE :—**

- One of Trustees of Ardee Drainage, 5312.
- Describes floods in district, 5313.
- Increased floods from improved drainage, 5324.
- Works do not carry out what they were intended to do, 5365.
- Area of, and expenditure on, Ardee district, 5369.
- Would give Board of Works general control of river, 5373.

**STONEYFORD DRAINAGE WORKS :—**

- Land Act of 1861, put whole charge on landlord, *Dillon*, 1778.

**STEVES, W. G. O. R. :—**

- Advantage of adopting a partial scheme for Barrow, 790.
- Depreciation of land from flood, 790.
- Change on occupiers in order to carry out drainage of Barrow, 764.

**STOCK DRAINAGE :—**

- For evidence respecting, see *O'Connor Dan*, and *Codrington*.

**SWILLYBORN :—**

- Effect of drainage on valley, *Kinsken*, 948, 966, *ibid.*, 5265, 5293.

**TEMPERATURE :—**

- Influence of drainage on, *Greene*, 4483. *Moore*, 3632.

**THROUGHTON DRAINAGE :—**

- Often little advantage is taken of arterial drainage for, *Le Fane*, 80.

**TOWNS, INCLUSION OF, IN AREA OF CHARGE :—**

- Ought under certain circumstances be charged, *Le Fane*, 80. *Kinsken*, 1025.
- Should be charged if relieved from floods, *Barrington*, 1184, 1192. *ibid.*, 1332. *Ball Greene*, *App.*, p. 279.
- Should be charged in proportion to valuation, *Kinsken*, 2094.
- Should only be charged when benefited, *Townsend*, 1871. *Baldwin*, 1778.
- Should not be charged, *O'Keefe*, 1941-1948.
- In Barrow district should be rated, *Price*, 935.
- when benefited, *T. Fitzgerald*, 2738. *Ball Greene*, 4463, *App.*, p. 279.

**TOWNSEND, EDWARD, C. E. (Professor of Engineering in Queen's College, Galway) :—**

- Describes drainage districts in Galway and Mayo under his control, 1461.
- Suggests change in system of giving loans, and rate of advance, 1514.

## TOWSE, EDWARD—continued.

- Discusses advantages of drainage to district in the way of giving employment, &c., 1527.  
 Charge should be put directly on occupiers, 1553.  
 Constitution of drainage board, 1559.  
 Cost and improved value of lands drained under Act of 1845 in Galway, 1563.  
 Towns and land benefited should only be charged, 1571.  
 Not much injury done by draining part only of river, 1573.  
 Should be more supervision for maintenance, 1588.  
 Drainage of Lough Corrib region, 1600.

## UPLANDS:

- Should they be included in area of charge? *Le Fane*, 5382. *Saunders*, 437.  
 Cases where it would be unfair, *Dillon*, 1818.  
 In Shannon district, *Saunders*, 627.  
 In Barrow district, *Hosford*, 843, 886.  
 ——— towns might be taxed to small extent, *T. Fitzgibbon*, 2461.  
 Improved land only should be taxed as a rule, *Garay*, 3413. *Greene*, 4428. See *Zones*.

## VALUATION OF LANDS IMPROVED BY DRAINAGE:—

- No power in Valuation Acts to increase valuation because of drainage, *Ball Greene*, 4452.

## WHISLER, W. H., C.E. (Boston, Lincolnshire.) :—

- Gives evidence respecting the drainage systems of Cambridge, Lincoln, Norfolk, and Huntingdon shires, 5774.  
 On river Witham there is a Central Drainage Board for arterial drainage, to which representatives are sent by six District Boards, 5778.

## WHISLER, W. H.—continued.

- Contributions are levied only from lands benefited, 5790.  
 The charges are on the land not on the individual rental, 5893.  
 Most of this district is embanked, the embankments being in some places half a mile or a mile from the river, 5815.  
 Preservation of the banks is in the hands of the Court of Sewers, created in reign of Henry VIII., and consisting of Commissioners nominated by the Crown, 5842.  
 Several of the towns in the district are subject to flooding, 5871, but do not contribute to the cost of drainage, 5872.  
 Describes the reclamation of Heacham Lake in Holland, 5890.  
 Cost of reclamation in Holland, 5893.

## WINTER FLOODS:—

- Are they desirable? *ESU*, 1239.  
 This depends on the nature of the soil, *Baldwin*, 1616.  
 In certain cases desirable, *O'Keefe*, 1874. *Biskard*, 2549, 2414. *Roberts*, 2916.  
 Should be removed in small districts not in large, *Garay*, 3337.  
 Considered beneficial on Soak, Coddington, 5381, 5405.

## ZONES:—

- Proposal to divide each catchment area into three zones for drainage purposes, and charge each in proportions of  $\frac{1}{3}$ ,  $\frac{1}{3}$ ,  $\frac{1}{3}$ , *Garay*, 3561.  
 Table showing how this would work out in Barrow district, *Ball Greene*, App., p. 289.



# MAP OF IRELAND.

Showing Drainage Districts, with their Rain-Basins executed under 5 and 6 Vic., cap. 89, and 9 Vic., cap. 4, coloured Blue

Drainage Districts executed under Drainage and Improvement of Lands Act (Ireland) 1863, Acts 26 and 27 Vic., cap. 88, etc., coloured Red

Rivers and Main Streams understood to require Drainage, where the area of flooded and injured lands exceeds 500 acres, coloured Green

N.B.—The actual Drainage areas are in no case shown, but only the portions of Main Streams along margins of which the inundated lands are situated. The lighter tints show the whole extent of Rain-Basin within which the Drainage Districts are situated.

Scale Ten Statute Miles to One Inch

Index to Rivers and Main Streams requiring Drainage where the area of flooded and injured lands exceeds 500 acres, coloured Green on Map.

No.	NAME	COUNTY
171	Abber	Galway
172	Abber	Cork
173	Abber	Sligo
174	Abber	Wicklow
175	Abber	Wicklow
176	Abber	Wicklow
177	Abber	Wicklow
178	Abber	Wicklow
179	Abber	Wicklow
180	Abber	Wicklow
181	Abber	Wicklow
182	Abber	Wicklow
183	Abber	Wicklow
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298	Abber	Wicklow
299	Abber	Wicklow

Drainage District executed under 5 and 6 Vic. cap. 89, etc., coloured blue.

No.	NAME	COUNTY	No. of Acres
1	Abber	Galway	92
2	Abber	Galway	92
3	Abber	Galway	92
4	Abber	Galway	92
5	Abber	Galway	92
6	Abber	Galway	92
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96	Abber	Galway	92
97	Abber	Galway	92
98	Abber	Galway	92
99	Abber	Galway	92
100	Abber	Galway	92

Drainage Districts executed under "Drainage and Improvement of Lands Act (Ireland) 1863," in Acts 26 and 27 Vic. cap. 88, etc., coloured red.

## REFERENCE.

No. of Counties	NAME	Colour on Map	No. of Counties	NAME	Colour on Map
1	River Shannon	...	17	River Moy	...
2	" Suck	...	18	" Ovoca	Yellow
3	" Inny	...	19	" Foale	...
4	" Fergus	...	20	Lough Corrib	...
5	" Bann	...	21	River Liffey	...
6	" Main	...	22	" Blackwater	Red
7	" Moyola	Green	23	" Lagan	...
8	" Ballinlerry	...	24	" Glyde	...
9	" Blackwater	...	25	" Foyle	...
10	" Slaney	...	26	" Finn	...
11	" Lee	...	27	" Mourne	...
12	" Dee	...	28	" Boyne	Brown
13	" Suir	...	29	" Lanne	...
14	" Barrow	...	30	" Fane	...
15	" Nore	Yellow	31	" Bandon	...
16	Lough Erne	...			

Minor Outlets, coloured "Grey."

Navigations shown thus

J.H.M.

November, 1886.



